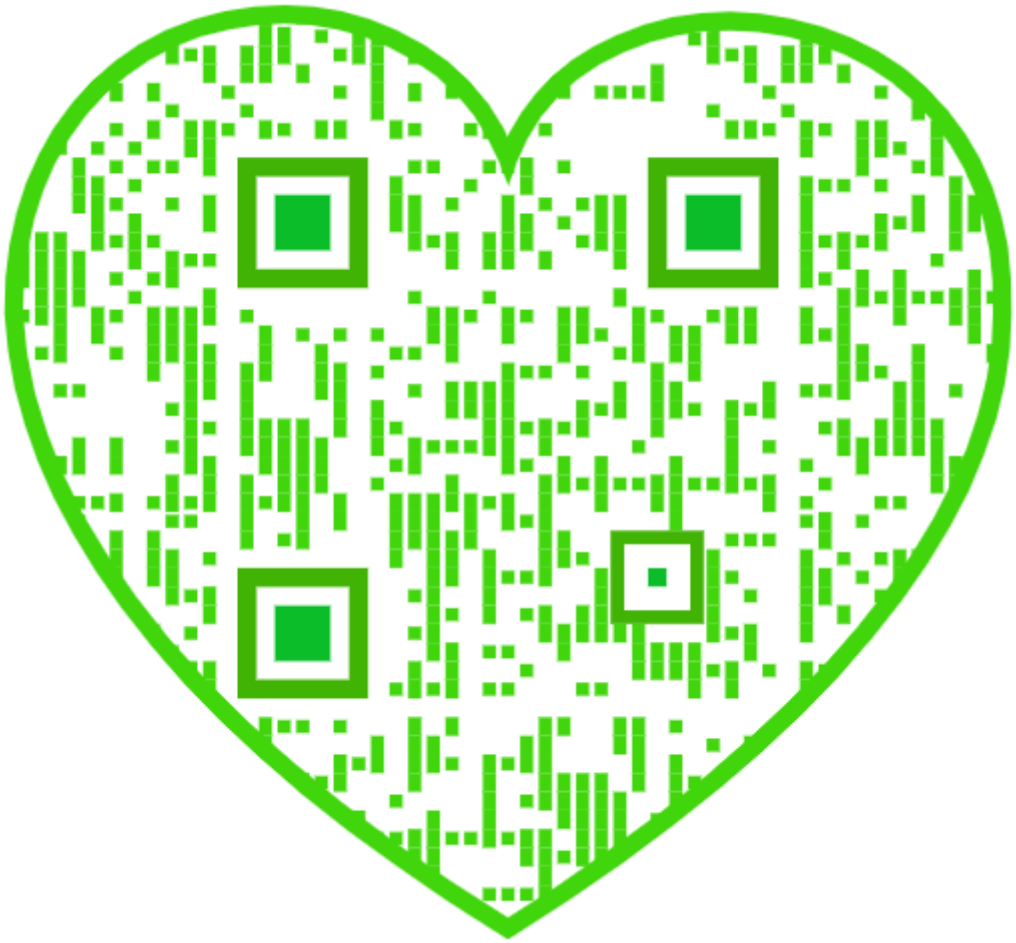

TRANSACTIONS OF THE

SECTION ON

Obstetrics, Gynecology and Abdominal Surgery

of the
American Medical Association
at the Seventieth Annual
Session, held at Atlantic City,
N. J., June 9 to 13, 1919

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LIST OF OFFICERS

The officers named below served this Section. That division of practice included under the title of "Obstetrics and Gynecology" was formerly included with branches which now comprise separate sections. The names have been taken from the published records, which are deficient in some cases. It will be appreciated if any additional data are brought to the attention of the Secretary of the American Medical Association.

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PROCEEDINGS OF THE SECTION

WEDNESDAY, JUNE 11—MORNING

The section was called to order at 9:05 by the chairman, Dr. Thomas J. Watkins, Chicago.

Dr. Reuben Peterson was elected delegate to the House of Delegates as substitute for Dr. F. F. Simpson, Pittsburgh, absent in Europe.

Dr. Thomas J. Watkins, Chicago, read the chairman's address, entitled "Progress in Gynecology and Abdominal Surgery." No discussion.

Dr. Samuel M. D. Clark, New Orleans, read a paper on "Use of Radium in Fifty Cases of Uterine Hemorrhage from Causes Other than Carcinoma or Myomas."

Dr. John G. Clark, Philadelphia, read a paper on "Treatment of Myoma Uteri with Radium."

These two papers were discussed by Drs. Harold Bailey, New York; Ernest C. Samuel, New Orleans; Arthur H. Curtis, Chicago; Edward H. Richardson, Baltimore; LeRoy Broun, New York; John Osborn Polak, Brooklyn; Henry Schmitz, Chicago; Samuel M. D. Clark, New Orleans, and John G. Clark, Philadelphia.

On motion by Dr. J. Riddle Goffe, New York, the recommendation was made to the House of Delegates that guests whose names were presented to the section be elected to honorary membership of the American Medical Association. Seconded and carried.

Dr. Arthur Stein, New York, read a paper on "End Results in More Than One Hundred Operations for Uterine Myoma (Operative Versus Roentgen-Ray Treatment)." Discussed by Drs. George E. Pfahler, Philadelphia; J. Riddle Goffe, New York; J. B. DeLee, Chicago; Thomas S. Cullen, Baltimore; Henry Schmitz, Chicago; Peter B. Salatich, New Orleans; LeRoy Broun, New York; C. N. Cowden, Nashville, Tenn.; Miles F. Porter, Fort Wayne, Ind., and Arthur Stein, New York.

Dr. Chalfant, appointed temporarily Drs. C. Jeff Miller, New Orleans; John Osborn Polak, Brooklyn; Henry P. Newman, San Diego, Calif., on the Executive Committee.

Dr. J. Riddle Goffe offered a resolution, requesting the House of Delegates to approve a committee of the section to take action concerning the international congress of gynecologists and obstetricians, which was referred to the House of Delegates.

Dr. George Gray Ward, Jr., New York, read a paper on "The Teaching Function of the Hospital: With Especial Reference to Gynecology." Discussed by Drs. R. M. Harbin, Rome, Ga.; Isaac S. Stone, Washington, D. C.; John Osborn Polak, Brooklyn; Henry P. Newman, San Diego, Calif.; C. E. Cantrell, Greenville, Texas; J. L. Bubis, Cleveland; J. H. Carstens, Detroit, and George Gray Ward, Jr., New York.

Dr. Emil Ries, Chicago, read a paper on "Alternating, Periodic Swellings of the Ovary." Discussed by Drs. Emil Novak, Baltimore; Alfred Baker Spalding, San Francisco; Peter B. Salatich, New Orleans, and Emil Ries, Chicago.

Thursday, June 12—Morning

The section was called to order at 9 o'clock by Dr. John W. Keefe, Providence, R. I.

Dr. Peter B. Salatich, New Orleans, read a paper on "Uterine Retrodisplacement and Results as a Cause of Reflex Neuroses." Discussed by Drs. E. E. Montgomery, Philadelphia; Charles Ober Kepler, Boston; Emil Novak, Baltimore; Rufus B. Hall, Cincinnati; J. Henry Carstens, Detroit; Isaac S. Stone, Washington, D. C., and Peter B. Salatich, New Orleans.

Dr. J. Henry Carstens, Detroit, read a paper on "The Desirability of Preventing Sterilization in Young Women When Operating for Tuberculous Peritonitis." Discussed by Drs. J. Shelton Horsley, Richmond, Va., and J. Henry Carstens, Detroit.

Dr. Henry P. Newman, San Diego, Calif., read a paper on "The Specialty of Obstetrics." Discussed by Drs. Edward P. Davis, Philadelphia; Gustav E. Zinke, Cincinnati; John F. Moran, Washington, D. C.; Arthur Stein, New York.

Dr. Joseph B. DeLee, Chicago, read a paper on "The Newer Methods of Cesarean Section: Their Indications: Results in Forty Cases." Discussed by Drs. James W. Markoe, New York; John Osborn Polak, Brooklyn; Bertha Van Hoosen, Chicago; Gustav E. Zinke, Cincinnati, and Joseph B. DeLee, Chicago.

Dr. Jennings C. Litzenberg, Minneapolis, read a paper on "The Use of Benzyl Benzoate in Dysmenorrhea." Discussed by Drs. Emil Novak, Baltimore, and Jennings C. Litzenberg, Minneapolis.

Dr. Frank W. Lynch, San Francisco, read a paper on "Treatment of the Severe Vomiting of Early Pregnancy." Discussed by Drs. Alfred Baker Spalding, San Francisco; Elnora C. Folkmar, Washington, D. C., and Frank W. Lynch, San Francisco.

Dr. Alfred C. Beck, Brooklyn, read a paper on "The Treatment of Extra-Uterine Pregnancy After the Fifth Month." No discussion.

Dr. John Gardiner, Toledo, Ohio, read a paper on "Aspiration and Pressure Treatment of Unopened Mammary Abscess (Puerperal)". Discussed by Drs. Richard C. Norris, Philadelphia; Peter B. Salatich, New Orleans, and John Gardiner, Toledo, Ohio.

FRIDAY, JUNE 13—MORNING

The section was called to order at 9 o'clock by the chairman.

The following officers were elected: chairman, Dr. Reuben Peterson, Ann Arbor, Mich.; vice chairman, Dr. Francis Reder, St. Louis; secretary, Dr. Sidney A. Chalfant, Pittsburgh; delegate, Dr. Lewis S. McMurtry, Louisville, Ky.; alternate, Dr. Rufus B. Hall, Cincinnati.

The secretary presented a report of a meeting of section secretaries held in Chicago which presented a number of standing rules for conducting the work of the section. On motion, the report, together with the standing rules, was adopted as a whole.

Dr. Donald Guthrie, Sayre, Pa., read a paper on "Trendelenburg Anesthesia in Surgery of Pelvis." Discussed by Drs. John Osborn Polak, Brooklyn; Albert J. Ochsner, Chicago; Donald C. Balfour, Rochester, Minn., and Donald Guthrie, Sayre, Pa.

Dr. Robert E. Farr, Minneapolis, read a paper on "Abdominal Surgery Under Local Anesthesia." Discussed by Drs. Penn G. Skillern, Jr., Philadelphia; C. N. Cowden, Nashville, Tenn.; J. A. Rubin, Pittsburgh; A. C. Scott, Temple, Texas, and Robert E. Farr, Minneapolis.

Dr. Donald C. Balfour, Rochester, Minn., read a paper on "Surgical Treatment in the Bleeding Type of Gastric and Duodenal Ulcer." Discussed by Drs. Raymond P. Sullivan, Brooklyn, and Alfred A. Strauss, Chicago.

Dr. J. Shelton Horsley, Richmond, Va., read a paper on "A New Operation for Duodenal and Gastric Ulcers." The discussion of the previous paper was continued in connection with the discussion of Dr. Horsley's paper by Drs. J. B. Blake, Boston; Alfred A. Strauss, Chicago; John T. Bottomley, Boston; George Goodhue, Dayton, Ohio; J. J. Gilbride, Philadelphia; Albert J. Ochsner, Chicago; Miles F. Porter, Fort Wayne, Ind.; W. J. Mayo, Rochester, Minn.; Charles A. L. Reed, Cincinnati; Donald C. Balfour, Rochester, Minn., and J. Shelton Horsley, Richmond, Va.

Dr. John H. Gibbon, Philadelphia, read a paper on "The Treatment of Gunshot Wounds of the Abdomen." Discussed by Dr. Edward W. Meredith, Pittsburgh.

Dr. Roland Hazen, Paris, Ill., read a paper on "Rational Surgery of Visceroptosis." Discussed by Drs. Robert T. Morris, New York; J. J. Gilbride, Philadelphia; J. Shelton Horsley, Richmond, Va.; Charles P. Noble, Philadelphia, and Roland Hazen, Paris, Ill.

PROGRESS IN OBSTETRICS, GYNECOLOGY AND ABDOMINAL SURGERY *

THOMAS J. WATKINS, M.D.
CHICAGO

The honor you have conferred on me and the confidence you have expressed in electing me to this office are greatly appreciated. Your indulgence for any errors I may unwittingly commit and your assistance are earnestly solicited.

We are honored by the presence of distinguished surgeons from allied countries. We extend them a sincere welcome and a cordial invitation to participate in our discussions.

This is the VICTORY MEETING of the American Medical Association. It is an occasion for great rejoicing. Democracy has defeated autocracy. The chief victory celebration is scheduled for our general meeting; it is fitting, however, to make brief mention of the important part taken by members of this section. We point with pride to the vast numbers that rendered meritorious service. We rejoice that most of them have returned to their homes and civil duties. We hold sacred the memory of those who made the supreme sacrifice; we extend to their bereaved ones our sympathy, and pledge them our service.

The radical changes that have taken place in the titles and subject matter of contributions to the literature of gynecology, obstetrics and abdominal surgery during the last few years emphasize the fact that much knowledge has accrued and much chaff has been eliminated. Many of the subjects that were of much value and interest in the making have ceased to furnish opportunities for brilliant, and, at times, acrimonious discussion.

* Chairman's address.

RECENT ADVANCE

A few examples of notable achievements will be touched on in order to illustrate the great advancement which has taken place in our specialties. Much has been accomplished in plastic surgery for the cure of cystocele, uterine prolapse, and rectocele. Operations for complete lacerations of the perineum and for vesicovaginal fistulas are relatively simple and efficient, when flaps are utilized and free separation of tissues, by blunt dissection, is made to obtain approximation without tension.

The importance of lacerations of the cervix has been determined to be chiefly its relation to erosions and leukorrhea. The investigations of Hitschmann and Adler, Sampson, and Curtis have demonstrated that curettage of the uterus is of little value except for diagnostic purposes, and is often attended by considerable danger, especially in septic cases.

The various operative procedures for retrodisplacement of the uterus have lost much of their interest; uncomplicated displacements have been found to be of little pathologic importance. A uterus so crippled that it cannot participate in reproduction should not be suspended; it is then useless and a menace to health.

The treatment of acute pelvic infections has made notable advances. It has become chiefly medical; surgery is largely reserved for relief from the residues of infection. This is especially true of acute puerperal infections. The chief danger to life in acute puerperal infections, excluding virulent streptococcus cases, has been found to be meddlesome, aimless, useless and dangerous traumatisms. Studies of nonoperative treatment of acute pelvic infections has long since revealed much knowledge of the important subject of acquired immunity. This achievement of the gynecologist has exerted an extensive and beneficent influence in the treatment of acute infections in all of the surgical specialties. These principles of treatment have of late been adapted to acute infections of the chest.

We can point with great pride to the accomplishments in abdominal surgery, especially to the fact that much important pathology was discovered by the abdominal surgeon—notably the pathology of the ovaries, fallopian tubes, appendix, gallbladder, and duodenal ulcer.

Study of the ductless glands has elucidated much hitherto obscure symptomatology of gynecologic cases, and has opened up a fertile field for further investigation.

Radium has proved to be a remedy of great value, as will be demonstrated by papers to be presented before this section.

OPPORTUNITIES FOR FURTHER PROGRESS

Notwithstanding all that has been accomplished, there remain many opportunities for research and improved surgery. Daily observations reveal the fact that much poor pelvic and abdominal surgery is done. Results are often disappointing. Subsequent surgery is often required.

Abdominal sections should have definite indications, and when performed, enough should be done to give assurance of a cure. Surgical tinkering with the ovaries, tubes and intestine is often a failure, and is frequently followed by disturbances necessitating further operation; such cases require very thorough study before surgical interference is resorted to. The character of the surgery in abdominal operations is too often exclusively determined by the pathologic condition found, instead of being adapted to the individual requirements. Similar pathologic conditions often produce very different symptoms in individual cases. The age, social status, and general health are also often important factors in determining the operative indications. It is highly important for the surgeon to have in mind an accurate history of the patient at the time of operation. I am convinced that the surgeon should

keep the patient under observation after operation until the cure is complete. This is especially important for the neurasthenic type of patient.

No adequate opportunity is offered for the development of the younger surgeon. He is too often obliged to learn by independent practice. Assistantships and fellowships for selected men should be established in all of the larger hospitals. The time best suited for such study and development would be at the end of their internships. Many of these men are forced into general practice and commercialized medicine to gain a livelihood.

Division of labor by the surgical staff of most of the larger hospitals would result in much increased efficiency. An excellent example of this is found in the organization established by Halstead at Johns Hopkins, which has proved its efficiency by the development of men prominent in specialized surgery. His organization limits the field of work, permits intensive study, and supplies enough clinical material for extensive investigation.

Brain surgery well illustrates the advantage of such division of work. It should be done by one. The amount of material would be enough to develop one surgeon efficiently, but would be of very little value if distributed to all of the attending surgeons.

Examples of lack of organization are illustrated in the annual reports of most of our larger metropolitan hospitals. One large hospital, which has very little specialized surgery, publishes a volume of detailed technic of organization. Among the history forms is one of twelve pages for gynecology—a twelve-page, "rubber stamp" type of history for pelvic diseases in the female. It is not necessary to tell you that this hospital has no department of gynecology and abdominal surgery. None of us would employ such a history form for gynecologic cases. We might, however, have a form of twelve or more pages of history for nervous

diseases, for diseases of the ear, or for any group of diseases which we are not competent to treat, but not otherwise.

Another hospital of about like size and character has a gynecologic department for the care of ambulatory patients, but no such special department for the care of hospital patients—an arrangement which does not suggest an organization established for efficiency. Both of these hospitals have medical college affiliations which have departments of gynecology. The inference would be that they consider specialists necessary for teaching but not essential for practice. These may be extreme cases but are illustrative of much of the lack of hospital organization. The men who are responsible for these conditions not only limit the usefulness of their institutions but restrict their own development.

The establishment of groups for surgical work is progressing and exerting a beneficial influence for better surgery. It is extending specialized surgery to the smaller communities. The combination of talent should bear the same relation to surgery that the combination of capital does to the industries. Such organizations in medicine should be for increased efficiency and not for increased profit. Organized groups established in large cities would result in much increased efficiency by development of more specialized surgeons. Organized groups would relieve the individual surgeon of annoying, time-consuming financial and other details, and would materially lessen commercialism. Groups could be of vast economic value by conservation of accrued accomplishments.

Much has been said relative to the practice of surgery by men with insufficient training. It is not my purpose or intent to offer any excuses for them, but to call attention to the fact that some of the responsibility for poor surgery rests elsewhere, especially with the men accountable to medical institutions of learning.

104 South Michigan Avenue.

USE OF RADIUM IN FIFTY CASES OF UTERINE HEMORRHAGE

FROM CAUSES OTHER THAN CARCINOMA OR MYOMAS

S. M. D. CLARK, M.D.

Professor of Gynecology, Tulane University of Louisiana School of Medicine

NEW ORLEANS

Radium being comparatively a new agent, it is premature to take the position that it has yet reached its maturity or possibilities. As all innovations do, it is now running the critical gamut. In one camp it is unconditionally condemned, while in the other it is equally acclaimed. Where such contention exists the truth is found in the midway position.

Though radium is yet in its developmental period, and though already we have abandoned some of our earlier fondest hopes, still, in the past five years, there have been deduced certain well established clinical facts.

It is always a pleasure to record success, therefore, in presenting cases of uterine bleeding from causes other than carcinoma and myoma. The chairman has given me a delightful subject: It is in this class of cases that radium gives its most brilliant results.

Menstruation is a complex process influenced by innumerable factors, ranging from undeveloped organs, defective endocrines and new growths down to constitutional dyscrasias. In many instances its derangement is a local expression of a constitutional condition; therefore it is most difficult correctly to divide cases of uterine bleeding, of these types, into segregated pathologic groups. In some instances the true pathology is not understood. For the purpose of presentation, the cases have been divided into three nominal groups.

GROUP 1. HEMORRHAGE IN YOUNG WOMEN

In Group 1 are placed those cases in which there is an excessive bleeding, with no marked local discomfort, but a decided constitutional impairment resulting from too great a loss of blood. In many of these cases there is no discernible anatomic wrong. Curetting, organotherapy and constitutional remedies fail; the bleeding continues, and in severe cases something radical must be done. What this "something radical" must be reduces itself to the removal of some of the organs, or to allowing the future welfare of the young woman to be jeopardized. Surely many of us have encountered such cases, and the action to take presents a serious problem.

If radium does not act, as we believe, entirely through altering ovarian function, but rather by altering the endometrium and myometrium, then it seems that this is a most valuable field for its use. The literature contains some encouraging reports, and it appears reasonable, as we improve and refine our technic, to expect some substantial help. Certainly it would be most valuable to know that excess bleeding could be controlled and the menstruation not suppressed.

Our experience has not been extensive in this group. In one of five cases there is one in which, by the use of small, graded amounts of radium, the flow was returned to normal. In another case, an effort to check the flow by graded doses failed, and the treatment had to be pushed on to complete cessation; but even this was better than an abdominal operation.

ILLUSTRATIVE CASES[1]

CASE 1 (62447)—*History.*—Miss R. B., a schoolgirl, aged 17, began menstruation at the age of 12 years. The flow was very profuse at the first menstruation and has continued so. She was operated on, June 5, 1917, and a curettage was performed. Since July 17, 1917, she had had practically a con-

1. Publication of the cases reported in this paper is made possible through the courtesy of the Radium Institute of New Orleans. This institute is composed of eight physicians of New Orleans, of whom the author is one.

tiuous vaginal bleeding. Three applications of radium were given, of 1,500 mg. hours.

Result.—Complete suppression of the menses followed.

CASE 2 (57958)—*History.*—A woman, aged 28, had a cyst removed from the right ovary when she was 22. Four months ago the menstruation began to be excessive and resulted in a flow lasting twenty-five days. She was curetted twice. Four treatments with radium of 3,859 mg. hours were given.

Result.—There was complete cessation of menses.

CASE 3 (55149)—*History.*—A woman, aged 33, for several years had had very irregular menstruation, sometimes lasting twenty-eight days. She was operated on for suspension, with no relief. One treatment with radium of 750 mg. hours was given.

Result.—The menstruation returned to a normal and two day type.

CASE 4 (57943)—*History.*—A girl, aged 16, started menstruation at the age of 13 years. It was very scanty and irregular. The uterus was curetted, Sept. 15, 1917, after which the menses stopped for three months, and the patient then bled continuously for two months. A small amount of radium was used from an outside source with no relief. Treatment of 1,275 mg. hours was given.

Result.—Two treatments produced a cessation of the menses.

CASE 5 (57783)—*History.*—Mrs. E. J., aged 25, began menstruation at the age of 14 years, and was made very sick from its inception. The bleeding lasted eight weeks, coming in large clots, and the flow was profuse. The menses were never regular. She had had one living child and two miscarriages, the last one a year ago, followed by four months of bleeding. She had had numerous operations. For the past year she had menstruated twice a month, each period lasting from six to seven days. For the past two months she had had a continuous uterine bleeding. Four applications of radium were given, the first of 75 mg., with eleven hours' exposure, and the remaining three of 50 mg., with eleven hours' exposure.

Result.—The condition was entirely relieved.

GROUP 2. AGGRAVATED AND INTRACTABLE DYSMENORRHEA

Cases of violent dysmenorrhea which have resisted all treatment, and in which the general health is markedly impaired, are placed in this group. The affection is most frequenty seen in the neurotic type who are reluctantly yielding to advancing years and are as yet

unmarried. It is commonly observed in teachers, or in those lately beginning to work, their mission in life still unsettled. The patient has about ten comfortable days in a month, the rest being spent in bed or in struggling to keep up during the premenstrual or the postmenstrual storm. In many of these patients there may be found no anatomic wrong, but the distress is there and is gravely altering her life. We have all had these rebellious cases, in which endocrines, stem passaries, curetting and climatic changes fail, and in which it is imperative that something be done. As a final measure, if the life is to be useful, menstruation must be stopped. We know that radium will cause the cessation, and we know further that the treatment is less painful and upsetting than an ablation operation and, still further, that it does not seem to be followed by as intense nerve disturbances. Twelve such cases are here reported, complete relief being obtained in all, chiefly through suppression; but in one instance the treatment relieved the pain, and normal menstruation continued, just as resulted in Case 3 in the preceding group.

ILLUSTRATIVE CASES

CASE 6 (64044)—*History.*—Miss L. S., aged 35, a schoolteacher, began menstruation at the age of 14 years and has always suffered pain, but had gradually grown worse in the past four years. She had been unable to teach in this time during her period. She suffered intense headache and backache, and her general health had been markedly impaired. She scarcely recovered from one month's epoch before another appeared. The organs were normal to palpation. A dilatation and curettage were performed and a stem pessary applied, without relief. She was given three applications of radium of 50 mg. and ten hours' exposure each.

Result.—A complete suppression of menstruation and a marked improvement of general health have followed.

CASE 7 (57686)—*History.*—Mrs. P., aged 28, who began menstruation at the age of 15 years, suffered severe pain and stayed in bed two days each month. She had been married two years, but had no children. She was operated on, March 13, 1913, having the left ovary removed and part of the right. Her general health improved after the operation, but at the menstruation period she suffered severe pain all over the

abdomen, and was forced to remain in bed, with frequent urination during the period. Five applications of radium were given, three of 50 mg., with ten hours' exposure, and two of 75 mg., with ten hours' exposure.

Result.—Suppression of the menstruation followed.

CASE 8 (62803)—*History.*—Mrs. V. B., aged 23, a saleswoman, began a normal menstruation at the age of 13, which gave her no trouble until Feb. 14, 1917, when the flow became profuse and very painful. She was curetted in April, 1917. The appendix was removed, May 15, 1917. The flow had been practically continuous since the April operation. The patient suffered great pain in the back, and general discomfort, and was anemic. She was given a treatment of 50 mg. of radium, Aug. 26, 1917, for a ten hour period, 50 mg., Sept. 9, 1917, and 25 mg., Sept. 19, 1917.

Result.—Complete relief followed.

CASE 9 (65262)—*History.*—Mrs. P. D., aged 31, who menstruated at the age of 13 years and thereafter regularly and normally, and who had been married fourteen years, having one child, aged 11 years, was operated on four years ago. An appendectomy was performed and a laceration sutured. For the past few years menstruation had been very scant, but the pain was so severe that it necessitated the use of hypodermic injections of morphin. This condition gradually grew worse. Four applications of radium were given, two of 50 mg. and two of 75 mg., ten hours' exposure each.

Result.—Complete relief followed.

CASE 10 (60654)—*History.*—Mrs. R. H., aged 33, who began menstruation at the age of 15 years, had been married eleven years, having no pregnancies. She had always suffered excruciating pains at the menstrual period, going to bed three days, and had passed large clots of blood. The flow was very profuse. Five applications of radium were given, each of 50 mg. and ten hours' exposure.

Result.—The menstruation was suppressed and there was complete relief.

CASE 11 (57713)—*History.*—Miss H. H., aged 30, began menstruation at the age of 14 years, and it was regular until she was 17, when it became irregular and developed pain. The pain had gradually grown more intense and she had to remain in bed one week. The flow was very profuse, especially in the past six months. Six applications of radium were given, each of 50 mg. and ten hours' exposure.

Result.—Complete relief followed.

CASE 12 (53695)—*History.*—Mrs. P. G., aged 25, who had been married four years, suffered with dysmenorrhea before and after marriage until the birth of her child. The appendix was removed, the ovary resected and the uterus suspended

shortly after her confinement. She then suffered with pains in both sides, and with a profuse menstruation, lasting seven days and extremely painful. She also had severe cramps in the legs. Two applications of radium were given, 75 mg. totally twenty-four mg. hours.

Result.—Complete relief followed.

CASE 13 (61710)—*History.*—Miss M. A., T. N., aged 35, menstruated normally until ten months ago, when she began suffering great pain and having a profuse flow. She had had a decided loss of weight in the past ten months. Two applications of radium were given, one of 50 mg., with ten hours' exposure, and one of 75 mg., with ten hours' exposure.

Result.—Suppression of menstruation followed and great improvement.

CASE 14 (68655)—*History.*—Mrs. V. B., aged 38, had a normal menstruation at the age of 13 years, and had been married fifteen years, having one child, aged 11, and one miscarriage, seven years ago. Nine months ago an appendectomy and a myomectomy were performed on her. She had a scant menstruation, and felt dredfully during the period, suffering general prostration. One application of radium of 50 mg. was given of 525 mg. hours.

Result.—Menstruation stopped for six months and then reappeared as the three day type, with no pain.

CASE 15 (55352)—*History.*—Mrs. H., aged 35, who had been married ten years, and concerning whom there is no record of menstrual history, was operated on two years ago for profuse menstruation, but without relief. She suffered intense headaches at the time of the flow, necessitating her remaining in bed. Two applications of radium of 75 mg. were given, with ten hours' exposure.

Result.—Suppression of the menstruation and complete relief followed.

CASE 16 (56065)—*History.*—Mrs. E. T., aged 30, had been married eight years and had never suffered from menstrual periods before her marriage. She had been married two years when a child was born, and was healthy for two years after, when pains in the sides and ovaries developed during menstruation. The menstruation began to be irregular and to appear twice a month. The patient was curetted one year ago for continuous bleeding, which was checked temporarily, but again appeared with the former pains. One application of radium of 75 mg. was given, with eighteen hours' exposure, a total of 1,350 mg. hours.

Result.—The flow gradually decreased. There have been no late reports.

CASE 17 (66803))—*History.*—Mrs. A. C., aged 32, who had menstruated normally and regularly until two years ago, had

been married thirteen years and had had two children, the youngest aged 10. She had had no miscarriages. For the past two years the periods had been exceedingly painful and associated with nausea and intense headaches. Three applications of radium were given, two of 50 mg. and one of 75 mg., each with ten hours' exposure.

Result.—Complete relief followed.

CASE 18 (71289)—*History.*—Mrs. M. D., aged 46, who had been married twenty-seven years and had no pregnancies, and whose menstruation was, as a rule, irregular, was operated on five years ago, an appendectomy and the removal of one tube and ovary being performed. After the operation the menses were regular, accompanied by a great deal of pain, requiring her to go to bed for a week. For the past three years she had been menstruating every three weeks; and for the past month the flow was very profuse, lasting from eleven days to two weeks. Four applications of radium of 50 mg. were given, with ten hours' exposure.

Result.—Complete suppression of the menses and complete relief followed.

GROUP 3: CHRONIC METRITIS

In this division falls the greatest number of cases. For want of a better term "chronic metritis" is used. Whether the pathologic condition is polypoid, hypertrophic or hyperplastic endometritis, or results from myopathic or vascular changes, most of these conditions are combined in the term "chronic metritis."

The ages of the patients are usually between 36 and 56 years. Many have had numbers of children; the uterus is in malposition, enlarged and firmer than normal, having associated therewith an enlarged chronic cervicitis. In these cases, bleeding is often rebellious; the patients may be curetted repeatedly, to no avail, and the final cure comes about through hysterectomy. Often the bleeding is so profuse that packing becomes necessary. To treat the condition, inflammatory diseases must be eliminated first; next, an exploratory curettage is performed in search of malignancy. Then, by the application of radium, the menstrual life is brought to a close. So far as our experience extends, it seems that the nerve upheaval is less through this method than the surgical. It is well known that most

of these uteri have about completed the useful period, and when complicated by pathologic changes following a low grade infection, only complete removal gives the desired relief. Radium is unquestionably preferable in that it accomplishes the same result with less discomfort and no danger to life. As will be seen from the histories, thirty-five such cases were treated, with one partial failure. In this case there persisted an occasional bleeding, especially after coitus, and fearing potential malignancy, the uterus was removed.

There is some discomfort associated with radium intra-uterine applications, as seen in malaise, nausea and general lassitude, lasting from twenty-four to thirty-six hours; but this is negligible in most cases, and its worst form is in no way comparable to the operative course. If radium had no other field of virtue than is evidenced in this group, its use is warranted.

Though radium is by no means fully developed, and even if we discount some of the earlier claims for it, there have been produced sufficient positive data to cause it to take rank as a useful agent, and I feel that it should be made available to the localities through cooperating professional groups.

ILLUSTRATIVE CASES

CASE 19 (58300)—*History.*—A woman, aged 42, who menstruated at the aged of 14 years, and whose flow continued regular and normal, had been married eighteen years. The oldest child was aged 16 and the youngest 11. For the past year menstruation had been very irregular and very profuse, lasting five days. At the last period there was a heavy flow lasting twelve days. Examination revealed a large uterus, freely movable. Two applications of radium were given, one of 75 mg. and the other of 50 mg., both with eleven hours' exposure.

Result.—Complete relief followed.

CASE 20 (62969)—*History.*—Mrs. H. S., aged 29, whose menstruation began when she was 16, and who has one child, aged 3, was curetted two years ago and had the uterus suspended and the appendix removed. For a year and a half following she had a profuse flow during menstruation, and for the past two months the flow had been almost hemorrhagic,

and accompanied with pain and large clots. She had pain in the back and the ovarian region, and lost weight and became constipated and anemic. Three applications of radium were given, each of 50 mg., with eleven hours' exposure.

Result.—Complete relief followed.

CASE 21 (61200)—*History.*—Mrs. L. T., aged 35, began menstruation at the age of 15 years, which was irregular and lasted eight days from the start. She had been married three months. The appendix was removed in September, 1916. Since the operation she had been bleeding twice a month. Menstruation was profuse and lasted from ten days to two weeks. She was very weak from the loss of blood. Two applications of radium of 50 mg. each were given, with eleven hours' exposure.

Result.—Complete suppression of the menses followed.

CASE 22 (65485)—*History.*—Mrs. F. Y., aged 36, who had been married ten years and had one child, aged 9 (no miscarriages), had menstruation which was regular, but always painful. About a year ago the flow became more profuse and more painful. She was operated on in June, 1917, an appendectomy, a removal of the left ovary and a resection of the right ovary being performed. Six weeks after the operation she had a severe hemorrhage, necessitating packing. The uterus was large, freely movable and normal in position. The patient was a marked neurotic and definitely anemic, and was almost a physical wreck from the excessive bleeding. Four applications of radium were given, two of 75 mg. and two of 50 mg. each, with ten hours' exposure.

Result.—A complete suppression of menstruation and a complete transformation constitutionally followed.

CASE 23 (64525)—*History.*—Mrs. A. P., aged 40, had been bleeding profusely off and on for the preceding nine years, and an amputation of the cervix and a curettage were performed five years ago. She has seven children, the youngest aged 10. After the operation, the bleeding was more profuse, hemorrhagic at times. There were severe pains in the abdomen during menstruation. Four applications of radium of 50 mg. each were given, with ten hours' exposure.

Result.—Complete relief followed.

CASE 24 (73309)—*History.*—Mrs. W. R., aged 31, had had a profuse uterine bleeding for three weeks. She was curetted, Sept. 16, 1918. Relief followed for only two months, and then bleeding recurred. There was a slightly bloody discharge off and on, and the flow was very profuse at the time of her period. Three applications of radium of 50 mg. each were given, with ten hours' exposure.

Result.—Complete relief followed.

CASE 25 (56058)—*History.*—The patient, aged 38, began menstruation at the age of 14 years. The flow was regular but profuse. She had two children. For several years she had had frequent bleeding, both at the regular period and between the periods. Curettage relieved her for only two months. The bleeding stopped for ten days; then, September 13, the flow started and continued almost hemorrhagic, until November 9. One application of 75 mg. of radium was given, with twelve hours' exposure, 900 mg. hours.

Result.—There has been an improvement in bleeding, but it has not entirely stopped.

CASE 26 (61691)—*History.*—Mrs. A. J., aged 31, was perfectly healthy until four years ago, when her menstruation began to be irregular, very profuse, and to last five days. She was operated on one year ago. A dilatation and curettage and an appendectomy were performed, but no relief was obtained. The patient suffered loss in weight and became anemic. Four applications of radium were given, three of 50 mg. and one of 75 mg. each, with eleven hours' exposure.

Result.—The condition was relieved.

CASE 27 (65465)—*History.*—A woman, aged 42, began menstruation at the age of 17 years, which was regular and of five days' duration, and had had five full time children, the youngest of whom is aged 5. The patient was well until May 11, 1917, when she was awakened by a flooding which lasted ten hours. She had not flooded any more until two months ago. During the past two months she had had two hemorrhages, gradually growing worse. During this hemorrhage her temperature was as high as 103.5. Feb. 22, 1918, a dilatation and curettage was performed. Seventy-five mg. of radium were introduced at the time of operation, with nineteen hours' exposure, 1,425 mg. hours. March 13, 75 mg. were given, 900 mg. hours. The patient returned to the city a few months ago with a temperature of 102, whereupon a pyometra was discovered containing from 6 to 8 ounces of pus, which was drained.

Result.—The patient continued normal.

CASE 28 (73517)—*History.*—Mrs. O. W., aged 39, concerning whom there was nothing of interest in her early menstrual life, was curetted three times for excessive bleeding, the last curettage being performed eleven years ago. She has one full term child, aged 16, and had one miscarriage eight years ago. Since this time had had excessive bleeding. The flow had continued for five or six months and been very profuse at times. Three applications of radium were given, two of 50 mg. and 1 of 75 mg.

Result.—Complete cessation of the menses followed.

CASE 29. (56976)—*History.*—Mrs. M. C., aged 36, had had menorrhagia for the past four years. Three months ago she

had a severe hemorrhage, and there had been an excessive flow for the past two months. One application of radium of 75 mg. was given, with twenty-four hours' exposure; four days later another, with twenty-two hours' exposure, and another with fifteen hours' exposure.

Result.—Complete cessation of the menses has followed.

CASE 30 (67828)—*History.*—Mrs. C. O., aged 40, who had had two children, the youngest of whom is aged 16, menstruated regularly until one year ago; she then began having flooding spells lasting from five to six days, and loss in weight. One application of 50 mg. of radium was given, with ten hours' exposure.

Result.—There was no return of the bleeding, and she was discharged relieved.

CASE 31 (73559)—*History.*—Mrs. S. C., aged 32, who had had four children, of whom the youngest is aged 4, had always had profuse bleeding during menstruation, but in the past four years it had increased in duration and in quantity. The patient was operated on a year ago; a cyst on the ovary was removed and a curettage performed. Since that time the bleeding has been more profuse and alarming, so that packing was the only means of control. She came to her physician to know if the uterus should be removed or if there was any other way that the alarming hemorrhage could be controlled. Three applications of radium were given, two of 75 mg. (one with ten hours' exposure and the other with twenty-four hours' exposure), and one of 50 mg., with ten hours' exposure.

Result.—Suppression of the menses and marked improvement constitutionally followed.

CASE 32 (57201)—*History.*—The patient, whose menstruation began when she was 15, and which was always regular until two years ago, had had five children, three of whom are living. Four years before the radium was applied, an amputation of the cervix and a curettage were performed for excessive bleeding and irregular menstruation. At the time of the operation the uterus was large and freely movable, and the amputation was performed with the hope that the uterus would diminish in size. The patient objected to the removal of the uterus. Three applications of radium were given, one of 100 mg., one of 75 mg., and one of 50 mg., with ten hours' exposure each.

Result.—The flow became slight, with spots after coitus. A hysterectomy was performed, but no malignancy found.

CASE 33 (56497)—*History.*—Mrs. P., aged 46, was in good health until six years ago, when she began to suffer with painful menstruation. Three years ago she began having an irregular flow, showing every three weeks and rather profuse. She was operated on one and one-half years ago for the

removal of a polypus on the cervix. She also took roentgen-ray treatments. The flow reappeared six months later, hemorrhagic in character. One application of 75 mg. of radium was given, with ten hours' exposure.

Result—Painful menstruation was entirely stopped and there has been no vaginal discharge.

CASE 34 (62617)—*History.*—Mrs. A. D., of whose case there is an incomplete history, was curetted unsuccessfully for excessive menstruation and profuse vaginal discharge. She was given an application of 25 mg. of radium, with twelve hours' exposure, with two large exposures.

Result.—Complete cessation of the menses followed.

CASE 35 (60940)—*History.*—Mrs. E. D., aged 41, whose menstruation began when she was aged 14, and was of the regular normal type, had been married nineteen years and had had two children, the oldest of whom was aged 16 and the youngest 11. She had had almost continuous uterine bleeding for the past year, very profuse at times and passing large clots. Amputation of the cervix was performed, June 30, 1917. Two applications of 50 mg. of radium, each with ten hours' exposure, were given.

Result.—Complete relief followed.

CASE 36 (65653)—*History.*—A woman, aged 42, who had been married twenty-one years, and has one child, aged 17, had been operated on six times for the repair of laceration and the removal of one ovary and tube. She had had fairly good health, only painful menstruation. Three months ago the menstruation began being irregular, appearing every fifteen days and lasting nine days. For the last six weeks she had been bleeding practically continuously, passing large clots. Three applications of 50 mg. of radium were given, each with ten hours' exposure.

Result.—Complete cessation of the menses and complete relief followed.

CASE 37 (68847)—*History.*—Miss H. K., aged 40, the history of whose case is incomplete, had profuse vaginal bleeding. There had been previous local treatment without result. Three applications of 50 mg. of radium were given, each with ten hours' exposure.

Result.—Complete cessation of the menses followed.

CASE 38 (63434)—*History.*—Mrs. M. L., aged 51, who had had ten children, of whom the youngest is aged 8, was curetted eight years ago for bleeding almost continuously, with a profuse flow. The menstruation was regular until twelve years ago, and since that time the patient had been bleeding in between the periods, the flow lasting from four to five days. Preceding the radium treatment, the bleeding was profuse and hemorrhagic in character. The vagina had

to be packed to stop the flow. Two applications of radium were given, one of 50 mg., with eleven and one-half hours' exposure, and one of 75 mg., with eleven hours' exposure.

Result.—Complete cessation of the menses followed.

CASE 39 (69957)—*History.*—Mrs. E. A., aged 50, who had had six children, of whom the youngest is aged 14, had had no menstrual disturbance until four months ago, and since that time had been bleeding almost continuously with a profuse flow, at times hemorrhagic in character. She was quite anemic, and felt weak from the loss of blood. Two applications of radium were given, one of 75 mg., and one of 50 mg., each with ten hours' exposure.

Result.—Complete cessation of the menses followed.

CASE 40 (71949)—*History.*—Mrs. C. P., aged 53, who went through the menopause four years ago, a year later, from excitement and nervousness, had bleeding start again. There had been a slight flow, lasting one or two days, for the last year. Malignancy was eliminated. Two applications of 50 mg. of radium were given, each with ten hours' exposure.

Result.—There was no evidence of bleeding.

CASE 41 (54998)—*History.*—A schoolteacher, aged 42, who began menstruation at the age of 14 years and was anemic, had no abnormal features of the flow until six years ago, when she developed an irregularity and menorrhagia. The condition had gradually grown worse, and she had been bleeding for the last ninety-five days. The uterus was slightly enlarged, the adnexae negative. Two applications of 50 mg. of radium were given, each for twelve hours, and two of 75 mg. for eleven hours.

Result.—Complete cessation of the menses, with a marked improvement of general health followed.

CASE 42 (53650)—*History.*—Mrs. M. L., aged 40, a healthy, normal person, had no menstrual disturbance until one year before the radium treatment, when the flow began to increase in duration and quantity, and a flooding spell occurred in May, 1916. When the patient was examined, June 1, 1916, she had a profuse, bloody, vaginal discharge. The uterus was about the size of a double fist, symmetrical and freely movable. There was no adnexa trouble. Fifty mg. of radium were applied, June 5, with eleven and one-half hours' exposure, and 75 mg., June 20, with eleven hours' exposure.

Result.—The uterus is now normal, and a complete cessation of the menses has followed.

CASE 43 (65626)—*History.*—Mrs. M. G., aged 40, who had been married twenty years and had three children, was operated on for complete laceration. For the past year the menstruation had been irregular and profuse in quantity, and there had been continuous bleeding for the past eight months.

The patient was anemic and very nervous, and had lost in weight. Three applications of radium were given, one of 75 mg. for eleven hours, and two of 50 mg. for ten and one-half hours.

Result.—There has been a suppression of the menses. Marked menopause symptoms were treated with hypodermic injections of corpus luteum.

CASE 44 (65596)—*History.*—Mrs. K. K., aged 42, who had been married seventeen years, and had had four children, all living, the youngest of whom is aged 8, had been curetted twice, the last time two years ago. The flow temporarily improved after curettage, but reappeared, quite profuse. For the past few months, the patient had been bleeding continuously, passing large clots. Three applications of radium, each of 50 gm., with eleven hours' exposure, were given.

Result.—The condition was completely relieved.

CASE 45 (70021)—*History.*—Mrs. B. L., the history of whose case is incomplete, began to have irregular menstruation ten years ago. For the past three or four months she had had flooding spells. She was curetted two years ago and operated on twice since then, but the flow continued. Two applications of radium were given, each of 50 mg., and ten hours' exposure.

Result.—The condition was completely relieved.

CASE 46 (61565)—*History.*—Mrs. J. M., aged 39, who had had her last child four years ago, was well until two years ago, when she began bleeding excessively. Curettage gave temporary relief. For the past month she had had a continuous flow. She had lost in weight and was anemic. Six applications of radium were given: Aug. 8, 1917, 50 mg., twelve hours' exposure; August 15, 75 mg., twelve hours' exposure; September 3, 25 mg., eleven hours' exposure; November 27, 50 mg., eleven hours' exposure; Jan. 1, 1918, 50 mg., ten hours' exposure, and June 6, 50 mg., ten hours' exposure.

Result.—Complete relief followed.

CASE 47 (53807)—*History.*—Mrs. B. V. M., aged 38, of whose case there is an incomplete history, had a miscarriage four years ago. One month later excessive bleeding started, lasting four days. Every month she bled excessively, suffering with pains in the right side, the back and lower extremities. Three applications of radium were given, two of 50 mg. and one of 75 mg., each with eleven hours' exposure.

Result.—The excessive flow was controlled and the patient now menstruates normally, the menstruation lasting six days.

CASE 48 (58277)—*History.*—A woman, aged 30, suffered from profuse and prolonged menstruation. An appendectomy was performed and a cystic ovary and small polypus removed,

Dec. 16, 1916. A practically continuous hemorrhage had persisted since the operation. Four treatments with radium, totaling 2,550 mg. hours, were given.

Result.—Suppression of the menses followed.

CASE 49 (56051)—*History.*—The patient, aged 45, had always had profuse menstruation, lasting for five or six days. The last few years she had menstruated twice in a month. The flow was copious. The patient had been treated locally for a long period. Two treatments with radium, totaling 2,675 mg. hours, were given.

Result.—The condition was completely relieved.

CASE 50 (56753)—*History.*—A woman, aged 35 years, had had flooding spells for several years, lasting five or six days. Blood appeared in large clots, and just previous to the radium treatment there was almost a continuous bloody discharge. The patient had been curetted twice, and her appendix had been removed. She had had two courses of deep, roentgen-ray therapy, which checked the flow for a year, but it reappeared in hemorrhage form. One treatment with radium, of 550 mg. hours, was given.

Result.—Complete stoppage of menstruation followed.

CASE 51 (55804)—*History.*—A woman, aged 44, had been menstruating irregularly for the past year and a half. The flow was very profuse and returned every nineteen days, accompanied by pains in the back. One treatment with radium, of 865 mg. hours, was given.

Result.—Complete relief followed.

THE TREATMENT OF MYOMA UTERI WITH RADIUM

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Sufficient time has now elapsed since my associates and I began the treatment of myomas and myopathic hemorrhages of the uterus with radium to arrive at a just estimate of its therapeutic value. Within certain limitations we may, with positive assurance, from our observation of more than 150 cases, assume that, from the standpoint of efficiency, safety and morbidity, this remedy must supplant surgical intervention in these tumors and for the relief of intractable myopathic hemorrhages. Beyond these limitations, however, we are also convinced that surgery still has a dominant place in the treatment of properly selected cases. Our experience of the last four years in the use of radium has, therefore, marked out rather well-defined lines of procedure, on which we may advance with safety. In any field of endeavor the danger of any innovation is that too much may be expected of it; likewise, too much is often claimed for it.

In our first experience we limited the use of radium to women within the menopausal cycle, and we have only gradually, and to a very limited extent, worked outside of this physiologic boundary, for we are convinced that in young women heedless radiation may be quite as unfortunate in its results as were the early efforts of overenthusiastic or poorly balanced ovariotomists. Radium is quite as potent in its power to bring on a premature menopause, and it is quite as upsetting to the nervous equilibrium of a young woman, as the removal of the ovaries. Fifty mg. of radium applied for twenty-four hours within the

uterus of a young woman will in many instances bring on an abrupt and serious menopause; and while in our series of cases one or two patients have received this dosage, it was given in our earlier experience, when the potentialities of radium were not fully realized and its dosage was yet within the period of experimental endeavor. We quickly learned that a moderately prolonged intra-uterine application was most hazardous and not to be repeated. As we view this question, three essentials are capital in the use of radium; first, an accurate diagnosis in all cases; second, the proper selection of cases; and third, the careful graduation of dosage, beginning when young women are being treated, with a minimum application and increasing the duration of application slightly if the first attempt fails to check the excessive flow.

In our study of results in women within the menopausal years, certain facts stand out in relief. Among the most obvious are these: The tumor must be uncomplicated with coincident inflammatory disease: it must be causing hemorrhage, and it should not be too large. In our cases, when pain, even without coincident evidences of inflammatory disturbance, has been present, it is seldom relieved even though the tumor largely disappears; and in other instances in which there was an old salpingitis, a flare-up of a quiescent process has occurred. In two cases a subsequent operation was necessary—in one a hysterectomy and in the other a vaginal puncture of a large pelvic abscess was necessary to relieve the patient. These two instances alone in our large series would not cast great discredit on this procedure, if all the other patients suffering with pain had been relieved of this symptom as the tumor decreased in size and menorrhagia ceased. Such, however, has not been the case; and we have, therefore, established a rigid rule that no patient suffering with pain lateral to the uterus is to be radiated. We choose an operation instead, for we can then ascertain

the extent of the pathology and treat it conservatively or radically, according to the indications. In this connection we desire most emphatically to protest against the use of radium in the treatment of any acute or quiescent inflammatory case, whether associated with a myoma or standing alone. One of my esteemed colleagues, a radiologist, informs me that this point should be emphasized especially, for already an occasional enthusiast asserts that radium may be beneficial in the treatment of pyosalpinx. This degree of optimism is very dangerous, and cannot too quickly be discredited, for we have already observed its evil.

In keeping this remedy well within its proper bounds, its great value may be established without reflections on it; but through such a policy as that just referred to, its employment will be discredited. The proper selection of the tumor to be treated from the standpoint of size and symptomatology is also clearly necessary, for a therapeutic policy that covers all myomas regardless of structure is, as we view our experience, without justification. We have seldom used radium in a tumor larger than the size of a five months' pregnancy, and then only under very exceptional circumstances, such as in the presence of grave cardiac or renal complication or serious consitutional defects which plainly rendered any operation too dangerous. The rule which we generally follow is to confine this treatment to cases in which the tumors are the size of a three months' pregnancy or smaller. This policy is based on previous years of experience in the surgical treatment of myoma, which has established the great frequency of associated lesions in these large tumors, and we believe, therefore, that we serve a better end in recommending an operation in this class of cases than the application of radium.

One not infrequently finds in many cases a degree of anemia not accounted for by the loss of blood, and

a complexion more like that of cachexia than occurs with an uncomplicated anemia; and furthermore, there is an asthenia of a toxic type which is not satisfactorily accounted for by a simple blood loss. Seldom is a malignant condition encountered, but not infrequently varying stages of degeneration of the tumors are discovered on macroscopic section marked by a grayish red or slaty discoloration of some of the tumors, indicating a partial gangrene, in others liquefaction necrosis, etc. Through the absorption of these necrotic or degenerating material serious inroads on the patient's constitution have occurred and a rapid healthful rebound follows a hysteromyomectomy. Based on these observations, we cannot look with favor on the conversion of these large tumors through radiation into retrogressive tissues, which through absorption may cause toxic symptoms. Under such conditions the patient may serve as the sarcophagus for her decadent tumor. Also, these large tumors are very frequently associated with, or through pressure have produced, other lesions, especially of the inflammatory class. Frequently pressure symptoms have forced the patient to consult the surgeon, and there may be no variation of the menses from the normal. In such cases the tumor may be a pure fibroid, largely of a dense hyaline or calcareous type, certainly not responsive to radiation.

For these, and still other reasons, therefore, we find no evidence thus far in our experience to convince us that the large tumors should not be removed by approved surgical methods. In no instance has there been so quick a decrease in the size of even the smaller tumors to justify us in believing that the larger tumors which are giving pressure symptoms will diminish sufficiently rapidly in even six months or a year to give satisfactory relief. We stand, therefore, on the general principle against radiation in tumors larger than a three monhs' pregnancy, and in only the exceptional case do we deviate from this rule.

Those who decry the use of radium in all myoma cases ring the changes on the dangers of sarcoma. Such objections have no basis in fact, for seldom, indeed, is sarcoma a degenerative or concomitant evil of myoma. If it were as common as is asserted by some of these alarmists, out of every series of 100 partial hysterectomies, as are usually performed by American surgeons, a definite percentage of recurrent sarcomas in the cervical stump should be encountered. In more than 1,000 hysterectomies performed in the gynecologic department of the University Hospital such a sequel has been observed but once. In a review of 816 myomas in our laboratory by my associate, Dr. Charles C. Norris, he finds only thirteen sarcomas, or less than 0.1 per cent., which were not diagnosed at the time of operation, only twenty-six such cases in all this series having been encountered. Based both on clinical and on laboratory conclusions, therefore, we deal with fears solely within the domain of fallacious supposition in discussing the dangers of sarcomatous changes in myomas and fibromas. Even were these fears jusified, there would still be no strong argument against the use of radium, since these tumors quickly react to this influence. It is not, therefore, the fear of sarcomatous degeneration which makes us slow to radiate large tumors, but it is because of the other objections just enumerated. To define our policy clearly, we would say that we radiate chiefly for one symptom, and that is hemorrhage. In myopathic changes in the uterus and in the smaller myomas causing excessive flow a safer or more certain means of relieving this symptom has not been found, for it acts with clocklike regularity, and we therefore consider a small myomatous uterus causing menorrhagia in a middle aged woman as no longer within the surgical domain. When radium is not available, the use of the roentgen ray in skilled hands may take its place. In the near future, therefore, we believe that the surgeon

who operates in this type of cases will have a difficult task ahead of him in justifying his action.

SYMPTOMS ACCOMPANYING RADIATION

Under special headings may be enumerated some of the occasional symptoms accompanying radiation:

Nausea.—Frequently within from twenty-four to forty-eight hours after the intra-uterine application of radium the patient will experience considerable nausea, not, however, greater than that observed after the administration of one-fourth grain of morphin in the occasional case. As we always perform a dilatation and curettage under nitrous oxid anesthesia, with a preliminary one-fourth grain of morphin administered one hour before the anesthetization, we have often felt that there were about equal chances between the effects of the radium and the morphin in the production of the symptoms; for nausea and vomiting are the exception rather than the rule after radiation. In no case has this symptom been either alarming or persistent.

Pain.—This symptom is also a variable factor, and may be attributable to the curettage, which is performed in all of these cases for diagnostic assurance. When this symptom persists or is accompanied by fever, we fear the possibilities of an acute inflammatory attack or the exacerbation of a quiescent lesion. This complication has occurred but seldom. However, it has been noted in possibly twenty or thirty instances in our series, and we are inclined to adopt in the future the plan of merely dilating the cervix and inserting the radium in those cases of periodic menorrhagias following a cyclic menstrual type without intermenstrual spotting; for in no instance have we discovered a carcinoma of the fundus in any of these cases, notwithstanding a careful routine study of the curettings. In those cases, however, in which there is intermenstrual spotting, or in which there is continuous bleed-

ing, curettage should never be omitted, for this is the court of final diagnostic resort. When this very suggestive symptom has been present, carcinoma of the fundus has occasionally been encountered and an immediate or subsequent hysterectomy has been performed. A simple hysterectomy carries so high a percentage of cures in this class of cases that we never trust to radium, but invariably choose the more radical surgical measure.

Leukorrhea.—The rule in all of our cases has been that a yellowish but never profuse leukorrhea will follow radiation for a short time—usually from three to six weeks. Hemorrhage likewise may not cease at once, although this is the rule. We warn our patients against apprehension if the flow does not cease at once, and usually tell them to expect no decided result under six weeks, although the great majority are relieved at once of excessive bleeding, but have a somewhat yellowish, sticky discharge for possibly six weeks, after which it ceases. In several instances a profuse leukorrhea has actually been cured by radiation.

Menopause.—The change of life in these cases varies in its phases, as the constitutional and temperamental characteristics of women vary. In this connection one might employ the lines of the comic opera librettist: "There are never two women alike, and never one woman alike twice." In the more marked grades of anemia we believe the climacteric change is more abrupt and attended with more pronounced symptoms. This may be explained on the theory that the hematogenous system has been working for weeks or months at a great speed in corpuscular generation, since the continuous loss of blood is so great that this excessive deficit must be remedied. A quick check on this great activity must in many instances jar the physiologic equilibrium and thus induce a more acute menopause. So far as we are able to judge, we believe that the menopause is somewhat more trying to the

average woman under an abrupt cessation than when she drifts into this change more naturally. In estimating the possible objections to radiation this symptom may possibly be classed in this light, although it in no way differs from the same sequel after a hysterectomy in which the ovaries are removed. In general, we find our patients very enthusiastic over their results, and count this possibly trying symptom as of light moment compared with their satisfaction over an escape from an operation.

FAILURE TO RELIEVE

In four cases we have failed to relieve patients sufficiently to satisfy them or ourselves, and we have subsequently resorted to a hysterectomy. Two patients have been operated on in other clinics. So far as we have observed, no disadvantage has occurred from the preliminary radiation, as all of the patients on whom an operation has been performed have recovered without complication.

TECHNIC OF APPLICATION

In our entire series of cases we have varied but little in our method of treatment. For women in the menopausal years, one extra-uterine application of 50 mg. of twenty-four hours' duration is made. Under gas the cervix is dilated and a simple curettage for diagnostic purposes is performed, followed by a light packing of the uterine cavity with a 5 per cent. solution of iodin momentarily before the radium is introduced. We enclose the platinum or silver radium container in a black rubber drainage tubing securely tied at each end. A 50 mg. tube is inserted into the fundal cavity to the top and left thus for twenty-four hours. When the cavity is 3½ inches or more in depth, we usually use 25 mg. tubes arranged in the rubber tubing tandem fashion, to insure a wider radiation of the uterine wall. After the radium is withdrawn, we usually keep the patient in bed three days, as after ordinary curettage, and at the end of five days she is discharged and permitted to resume her ordinary duties.

In women under 40 years of age we grade the dosage largely according to their years. As a rule, if the menorrhagia is excessive we may leave the tube in place twelve hours if the patient is over 35. In still younger women we never apply it more than six hours, choosing rather to make a reapplication several weeks later if the first fails. In this way the menopause will not be induced. There are several instances in our series in which normal menses have occurred after an interval of weeks or months, even when a twenty-four hour dosage has been applied; but as a rule the menopause is permanent.

RESULTS

In one phenomenal case, that of a woman aged 32, married ten years and sterile, who had suffered from severe menorrhagia which had reduced her hemoglobin below 35 per cent., the flow ceased quite abruptly and she passed through a rather severe menopausal period and yet became pregnant and went to term; but through a severe postpartum hemorrhage the poor woman lost her life. In many instances patients have passed through a typical climacterium, and the periods have returned and have then resumed a normal menstrual physiology. This phenomenon has been sufficiently frequent to make us believe that the radioactivity of the usual dosage is expended chiefly within the uterus and not on the ovaries. In considering the amount of radium employed in these cases, we feel that the smaller dosage, such as we have indicated, has given very satisfactory results, and, therefore, it is within the easy range of every well equipped hospital to have available at least 100 mg. of this substance for use in their clinical departments. It should, however, be placed within the jurisdiction of one capable clinician of the staff to advise as to its use. Certainly it is not a remedy for haphazard use, for it requires the training and judgment of a skilled specialist to advise as to when and how it should be applied.

ABSTRACT OF DISCUSSION

OF PAPERS OF DRS. S. M. D. CLARK AND JOHN G. CLARK

DR. HAROLD BAILEY, New York: In the radium treatment of cervical cancer there are two problems: The application of the radium to the cervix in such an amount that there will be a retrogression of the local lesion without the production of deep slough or fistula, and the radiation of the parametrium by such massive dosage that the necessary amount of ray intensity (whatever that may be) will reach all parts of the pelvic tissue involved. The first problem is comparatively simple from the point of physical conditions, for the cervical canal is approximately in the center of the involved part and offers an ideal location for an applicator in the shape of a capsule. This type of application will probably always be the chief or most important single factor in the treatment. Granting that a complete retrogression is produced in the cervix, then we are in the same position as if the cervix and uterus had been removed by a simple hysterectomy and the return of the disease is just as certain as if this operation had been done. With small amounts of radium the only way so far as I know, of producing distant effects in the parametrium, excluding rectal application, is by reapplication of the capsule to the same areas in the cervical canal. Experience through nearly two years of use of radium in this manner has convinced me that it is seldom effective and furthermore that it produces lesions which are quite important as regards the patient's comfort. The second problem is best solved by two types of accessory applications that require large amounts of radium, amounts in the magnitude of a gram. Properly protected these large doses may be placed for short periods in the posterior fornix at either side of the cervix and thus radiate the lower part of the broad ligament. Amounts of 1 gm. may be placed above the surface of the skin and over different areas in turn and thus conduct an additional radium intensity into the pelvic tissues. In this manner it is highly probable that sufficient radium intensity can be produced throughout the pelvis to affect unfavorably any cancer cells that may happen to be there. Unfortunately just the amount that will accomplish our purpose without producing an endarteritis that will some months in the future cause a sclerosis with stricture and fistula and other serious symptoms, must be arrived at by cautious experiment. Therefore, it is quite patent that the possessor of small amounts of radium must be satisfied at present to conduct palliative treatment of inoperable cancer and should not attempt to treat operable cancer. The preoperative treatment of cervical cancer with radium should consist (where only small amounts are available) in using the intracervical capsule for a considerable dose and then waiting three or four weeks before

operating. Caution must be used in considering too favorably the temporary healing of the local lesion for the common history of these cases is that within the period of a year further cancerous development ensues. In cancer of the body of the uterus operation should be done following radiation. Under radium treatment small fibroids may retrogress so that their size cause no symptoms. Larger fibroids may diminish in size but there remains above the true pelvis a heavy sclerotic mass that is apt to cause symptoms from its weight alone. The bleeding in most of the cases may be checked entirely. Cessation of menstruation is probably caused by the lack of functional activity of the ovary and the endarteritis produced in the tumor itself. In selecting the cases it is necessary to rule out not only all those with abnormal conditions in the pelvis but also all very large or the pedunculated or adherent or submucous fibroids and also all those with large retrocervical nodules. There remain suitable for the radium treatment all those that have some physical condition rendering operation inadvisable and also all small freely movable fibroids without any discernible complications. This last mentioned group should have the radium treatment as a tentative measure. The mortality from radium treatment of fibromyoma together with that of the undiagnosed and untreated complications may be higher than 1.5 to 2 per cent. Radium is particularly successful in the treatment of this class of cases. As in the fibroid group the bleeding does not cease usually unless the menstruation is stopped. Care must be used in selecting these cases. A thorough curettage should be done and all the scrapings examined. One piece may show adenomatoid membrane and a nearby section may show signs of beginning cancer. Another possibility that deserves consideration in the radium treatment of younger patients is that a partially ripe ovum may be so injured that on impregnation later abnormal development may occur.

DR. ERNEST C. SAMUEL, New Orleans: We have not attempted to radiate tumors that are large or rapidly growing, impacted in the pelvis, causing pain or pressure symptoms. We have done this only when they were of small size and in patients beyond 35 years of age. The tumors not causing hemorrhage have been left to the surgeon, except in probably one or two instances. I was glad to hear what Dr. Clark said concerning sarcoma being a bugbear in the matter of radium treatment. We have had some pain following the application of radium, but since we have ceased using morphin preliminarily to radium the nausea has been reduced at least 75 per cent. We have given up entirely the use of gas for the introduction of radium. Of the 125 patients treated three have come to operation. In one case there was no result whatever from very large doses frequently repeated.

As Dr. Clark said, after very careful examination there was no evidence of malignancy found in the specimen. I have had three unhappy experiences with a lighting up of infection after radium was used. I cannot agree with Dr. Clark as to the menopause being a bit short. Our observation has been different. It seems to come on a little more slowly and not to produce the symptoms as fast as he has observed. In regard to malignancy, we are not using the very large dosage of which Dr. Bailey speaks. We have absolutely discarded it, using only the smallest dosage, and after three treatments, which I think is a little more than Dr. Clark gives, if there is no appreciable effect on the mass, we stop treatment entirely and tell the patient's family that nothing more can be expected of radium. Dr. Schmitz of Chicago has demonstrated that implanting the radium tube in the parametrium is of much value. It seems to offer much in the future care of these cases, especially in recurrences out in the parametrium and deep in the pelvis

DR. A. H. CURTIS, Chicago: Of the patients whom we have treated with radium we have available statistics from 229. Forty-six with uterine cancer have obtained some palliative relief. Of this number there has been very marked amelioration of the symptoms in fourteen. Up to the present we have had no patient in whom we anticipate that a permanent cure has been secured. The hemorrhage ceases, the discharge stops, the cervix almost invariably heals over; there is cessation of pain for several months, but eventually the patient succumbs to the disease. In the protection of the bladder and the rectum we have found that, instead of the use of the customary gauze pack, insertion of a rubber dam is very much more satisfactory. Because of its elasticity it can be inserted without distress; the parts are forced away from the carcinomatous tissue and we have absolutely no trouble from adhesive vaginitis. In cases in which it is desirable to use radium as a preliminary to operation I think it is well either to operate within the first twenty-four hours before inflammatory reaction has occurred, or to wait for two and a half or three weeks in order that an immunity may have been established from the inflammatory reaction following the application of radium. In the noncancerous group of cases, without doubt radium is of great therapeutic value. We are able to effect a cure in almost all cases where radium is indicated. We have found that the routine use of 1,200 mg. in small sized fibroids and with patients in the menopause there is a tendency to hot flushes which disturb an otherwise excellent result. On this account we are inclined to use a smaller dosage and have recently employed 1,000 mg. or less. In severe hemorrhage in women of younger age, the so-called idiopathic hemorrhage, even a smaller dosage will suffice. In all of these

nonmalignant cases there is apt to be bleeding for several weeks, sometimes for a couple of months, but almost always a cure is assured if we are patient. Another complication is that of a very profuse watery discharge, persisting oftentimes for three or four months; but I know of no case in which it has not spontaneously ceased. I am optimistic concerning the use of radium in intractable leukorrhea of cervical origin. The cervix is open to infection from below. As a result there is marked hypertrophy of the cervical tissues, which are permeated with infection by all sorts of organisms. Fifty milligrams of radium are inserted in the cervix as high as the internal os and left for twelve to sixteen hours. Its use is sometimes necessary again after two months. But finally the glands are destroyed and the infection ceases. The ultimate results are extremely gratifying.

Dr. Edward H. Richardson, Baltimore: I am glad to note that the general tone of these papers has been conservative. There is no longer any doubt about the superiority of radium over other methods of treating certain cases of myoma and I believe the specific indications for its use will soon be defined accurately through the splendid work now being carried on in this field by those possessing this agent. In general, I agree with the limitations as outlined by Dr. John G. Clark. There is one group to be kept in mind, however, which he may have mentioned. This is illustrated by a case of a myomatus uterus not larger than a four months pregnancy in which I advised operation. The ovaries could not be palpated prior to laparotomy and when they were exposed, the left one was found to be moderately enlarged from cystic degeneration while at one point on its surface there was a papillomatous outgrowth, one and one-half centimeters in diameter, which appeared to be carcinomatous in nature. One must be careful to eliminate such early cases of carcinoma of the ovaries as a complication of myoma before advising radium, because, if I am informed correctly, it has been the uniform experience of radiologists that malignant growths of the ovaries are not amenable to this form of therapy. With reference to the treatment of carcinoma of the cervix and of the body of the uterus by radium, my observations have been limited to a small series of cases, all either hopelessly inoperable or instances of intrapelvic recurrence. Under such circumstances a cure could not reasonably be expected, but in all of them the rate of growth seemed to have been materially retarded and in other respects, too, its superiority as a palliative measure in these hopeless cases was convincingly shown. It is quite possible that further improvement in the technical methods of radiotherapy may yet reward by brilliant achievement the efforts of those now courageously working in this discouraging field. In the meantime they should receive the unstinted cooperation and encouragement of the profession.

DR. LEROY BROUN, New York: It would be a great mistake to allow the impression to go out from this meeting that we may indiscriminately make use of radium or the roentgen ray in the treatment of fibroid tumors, and I am glad of this opportunity to accentuate the limitations placed on the treatment of fibroid tumors as Dr. Clark of Philadelphia has done. He clearly brings out the point that the essential factor is a positive diagnosis ,that there are no complications and the other that of hemorrhage. The presence of pain indicates that some intercurrent pathologic condition exists, such as associated disease of the ovaries and tubes with adhesions or changes in the tumor growth. In 1,760 consecutive cases of fibroid tumors in which operation was done, the following changes had taken place in the tumors: In ninety cases there were necrotic changes; in twenty-five cases there was calcareous degeneration and in twenty-five cases there was malignant disease of the fundus—not of the cervix. In others words, in 8 per cent. of the fibroid tumors conditions existed in which radium should not be used and in which, as a rule, no knowledge of such changes could be diagnosed prior to the operation. There were a number of ovarian complications, 3 per cent. contraindicating the use of radium. These included ovarian cysts, dermoids and malignant disease. In 7 per cent. there was an infectious salpingitis, not salpingitis the result of increased circulation associated with fibroid tumors. This is where the danger arises in the use of radium—in our inability to make a positive diagnosis and to exclude the intercurrent pathologic condition. In a clear case, however, with absence of coincident pathologic conditions, or of degenerative changes in the fibroid tumor growth, radium is unquestionably of the greatest possible assistance. By it we can control hemorrhagic symptoms in uncomplicated fibroids and save the patient from a mutilating operation. I am glad to place this emphasis on the limitations in the use of radium which Dr. Clark has brought out.

DR. JOHN OSBORN POLAK, Brooklyn: Diagnosis is the keynote. All have defined the class of cases in which radium should be used, but they have not shown us how to make this diagnosis. Dr. Clark of New Orleans says they have discarded the use of morphin and of anesthesia in the introduction of the radium, but he does not tell us how he makes a definite diagnosis as to the absence of inflammatory adnexal conditions without the use of anesthesia. Of course, histories are almost always reliable, but erorrs occur in the best regulated hospital. We recently had two cases in which we used radium; a very active reaction resulted. Both tubes and ovaries had been removed for inflammatory conditions. The operating surgeon had left a large metritic uterus which was causing hemorrhage. Both these women were suffering from

diabetic trouble and operative intervention was inadvisable. Both patients were cured with radium but the introduction of radium into these uteri caused the most active inflammatory reaction in the parametrium and in the peritoneum. Our own experience with radium has been limited to these cases of enteritis or subinvolution near the menopause with hemorrhage. We have had seventy-six cases treated for hemorrhage with absolute cure of the bleeding in all of the cases. Three patients have had to have repeated exposures. There has been only one case of a young girl in which radium was used for the control of hemorrhage. This case was treated by repeated small applications of radium with a most satisfactory result. I think it is a mistake for us to give the impression that operation for fibroids is to be eliminated. In watching the cases of other men in which large doses of radium have been used for the control of tumors I have been very much interested in seeing that a number of these cases had subsequently to be operated because of pressure changes and lack of diminution in size. The hemorrhage, however, in all cases in which I have seen radium used and in all the cases in which we have used it ourselves, has been absolutely controlled.

DR. HENRY SCHMITZ, Chicago: We have endeavored to find an explanation of the fact that some myomas disappear following radium application while others do not. In the latter instance the microscopic sections invariably show the presence of numerous atrophic fibroblasts and an abundance of highly differentiated fibrous tissue. In myoma uteri the dosage has been reduced greatly in the last two years in our work and we now deem a single application of 25 to 35 mg. for twenty hours sufficient to bring about amenorrhea. If the patient fails to respond to one such application we may repeat the dose after three or four months, when the desired result will be obtained. Such a careful plan of treatment prevents the later appearance of profuse leukorrhea of which so many patients complain and which at times seems to be quite persistent, lasting not only three to six months, but sometimes even a year. Concerning the use of radium in carcinoma of the uterus we must always remember that if it did nothing else than give relief it is preferable to the cautery in inoperable cases. In the hemorrhagic myopathies the results of radium therapy have been good, provided the causative factor has been corrected first. It is of special importance to rule out malignancy. Of twenty-three inoperable cases of cancer treated in 1914 three patients are living and well today, having had no recurrence. The demonstrable reduction in the size of the tumor of a kind not to be attributed to the natural processes of evolution of that tumor or its associated lesions is the one essential feature to be observed in speaking of a

curative action of any agent. On the other hand, if such a therapeutic measure relieves symptoms such as hemorrhage and discharge and brings about local healing, the agent is only a palliative one. If we consider the results of radium therapy from this point of view we shall avoid many misunderstandings or wrong conclusions.

DR. SAMUEL M. D. CLARK, New Orleans: If the case histories are studied it will be seen that most of the patients had previously been operated on in some fashion. As to the fibromyomas, I was interested to hear of the percentage of adnexal inflammation being so low, not over 30 per cent. In the colored women, among whom myomas are common, adnexal inflammation is found in 85 per cent., leaving only 15 per cent. suitable for radium treatment. It is to be regretted that there was not more discussion on the control of menstrual bleeding in young women without producing suppression. We need more light on this phase of the subject.

DR. JOHN G. CLARK, Philadelphia: So far as my attitude toward radium is concerned, therapeutically it is at most a mere handmaid of surgery. As I have stated in my paper, there are cases of fibroid which should not be treated by radium, thus reducing the total number of cases to which radium is applicable to a smaller proportion than those submitted to surgery. Particular stress should be laid on the necessity for all of these cases to have the best diagnostic advice before the determination to use radium or the roentgen ray is arrived at. Certainly, it is not within the province of the roentgenologists to pass on this phase of the question. Unless this decision is carefully controlled, serious opprobrium will be cast on a very valuable remedy. Dr. Samuels believes that his patients have not suffered as much with acute menopausal symptoms as ours have. Possibly this may be due to the fact that he has used a smaller dosage. At least, this is the only way in which I can explain the apparent difference in our results. So far as the question of leukorrhea is concerned his patients appear to have a slight leukorrhea but like our series, this is never annoying. Seldom are they troubled with this slight discharge for more than six weeks, and in many instances not at all. A very gratifying sequel in several cases of chronic leukorrhea has been a cure by the use of radium. The one point on which special stress should be laid is that radium does not take the place of surgery, except in a limited number of cases. Every surgeon here knows how reluctantly he advises a hysterectomy in a woman in the menopausal years who is suffering with mere myopathic hemorrhage or from a very small fibroid, as the gravity of the operation is greatly out of proportion to the lesion. These are the cases par excellence for the use of radium and they should never be submitted to operation.

END-RESULTS IN MORE THAN ONE HUNDRED OPERATIONS FOR UTERINE MYOMA

OPERATIVE VERSUS ROENTGEN-RAY TREATMENT

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In this contribution I hope to show, on the basis of accumulating personal experience and a careful comparison of my results with those of others, that in the successful treatment of uterine myoma surgery still is and probably always will be the most efficient measure at our command. Many attractive and apparently plausible arguments are continuously advanced on behalf of roentgen-ray treatment of these tumors, and the time has come for a definite agreement on this question in the best interest of patients and physicians.

An exaggerated confidence in the benign character of uterine fibroids, not warranted by facts, has led many to accept the roentgen-ray treatment temporarily, relying on surgery in case of failure. The tendency of fibromyomatous tumors of the uterus to undergo sarcomatous degeneration, as well as many serious complications on the part of other pelvic organs, are too often overlooked in the prevailing tendency toward generalization of roentgen-ray treatment. This serious risk I have emphasized before[1] in an article in which I mentioned the case of a young girl in the early twenties. We contemplated radiation for a large uterine fibroid, but for certain reasons decided to operate, and on microscopic examination found the tumor to be a fibrosarcoma. It is of great interest to

1. Stein, Arthur: The X-Ray Treatment of Uterine Myomata: A Warning Based on a Study of the Literature, M. Rec. 89:991 (June 3) 1916.

note this patient's subsequent history, reported by Dr. Vineberg at the meeting of the New York Obstetrical Society in January, 1919:

About two and a half years after the first operation she came to the Mount Sinai Hospital with the complaint of pains in the lower abdomen, and two masses were found behind the cervical stump. At operation both these masses were found to be retroperitoneal, a considerable distance from the cervical stump, and lying deep in the abdominal cavity. They were both removed, and were found, on microscopic examination, to consist of myomatous tissue showing sarcomatous elements.

Dr. Vineberg quite rightly emphasized the importance of this case, for we had here the recurrence, extraperitoneally, of a myosarcoma after its removal from the uterus, in contradistinction to the belief that a myoma of the uterus, with sarcomatous elements, is not truly a malignant growth and seldom or never recurs or gives rise to metastatic growth.

It is, of course, impossible to recognize incipient or even advanced malignant changes of a myoma within the uterus. Its benign character is taken by the radiologist entirely "on faith." As Tracy[2] puts it, he is indeed to be congratulated if he can in every case determine when malignancy is present, or when the tumor is undergoing degenerative changes.

DIFFICULTIES OF DIAGNOSIS

The unrecognizable degenerative changes present in these tumors, as well as the associated pathologic conditions in the adnexa, have very recently been emphasized by Le Roy Broun[3] as contraindications to roentgen-ray treatment. The absence of malignant change can be reliably established only with the assistance of

2. Tracy, S. E.: Report of One Hundred Consecutive Cases of Fibromyomata Uteri Subjected to Operation, J. A. M. A. 67: 1213 (Oct. 21) 1916.

3. Broun, Le Roy: A Review of the Uterine Myomata Operated on at the Woman's Hospital during 1918, Comprising 262 Cases, Am. J. Obst. 79: 333 (March) 1919.

curettage, permitting exclusion of a concomitant carcinoma of the uterus.

As is well known, however, it is in many instances absolutely impossible to perform a probatory curettage of the uterus because of the fact that the uterine cavity is entirely obstructed by an intramural myoma. In these cases we are unable to determine by microscopic examination whether or not sarcomatous changes are present in the tumor or carcinoma of the body of the uterus exists. No gynecologist, no matter how skilful a diagnostician he may be, is safe from the danger of mistakes in these cases. Furthermore, old, hardened pus tubes lend themselves to confusion with uterine myoma. Even sarcoma of the ovary may be mistaken for a fibroid growth.

Two examples of mistaken diagnosis recently came to my attention, and in both instances the patients were examined by several well trained diagnosticians, who all agreed that each patient had a simple myomatous tumor. When the first was operated on, the hard, regular mass was found to be not a myoma but a very old and large pyosalpinx sac, firmly adherent to the normal sized uterus. The second patient was a woman aged about 45, with two large tumors on each side of the uterus. These tumors were hard and easily movable and were thought to be subserous myomas of the uterus, whereas, on operation, the uterus itself was found to be perfectly normal in size and shape, and the tumors were found to belong to the ovaries. Each tumor was found to be about the size of a man's fist and nowhere adherent, and, on microscopic examination, both proved to be spindle-cell sarcomas.

The case of a fibroid tumor associated with adenocarcinoma of the uterus in a woman aged 54, reported by Dr. Vineberg at the November, 1918, meeting of the New York Obstetrical Society, is also of interest in this connection. There was absolutely no reason to suspect malignancy until the extirpated uterus was

opened, and evidence of extensive adenocarcinoma of the endometrium was discovered, requiring a second operation.

The statement of Stern[4] to the effect that all uncomplicated cases of uterine fibroids are amenable to roentgen-ray treatment is thus seen to be open to the very serious objection that about 50 per cent. of the cases are complicated, as I shall show in my own material, and that it is not possible at the present state of our knowledge to acquit a given uterine fibroid of all suspicion in this respect.

DANGERS OF DELAY

In view of the high percentage of associated malignant disease, Deaver[5] distinctly challenges any form of treatment tending toward delay. Many degenerative changes were discovered at the time of operation in his series of cases; of the last 513 myomas, 111 showed hyaline degeneration; hemorrhagic, necrotic or calcareous changes, or a combination of these, were found in twenty-six others. Pus tubes were noted fourteen times. Eight uterine fibroids were associated with cancer. Sarcoma of the ovary was also represented. Several associated ovarian cysts, when operated on, already showed early malignant changes. The exposure of these patients to carcinoma or sarcoma through postponement of surgical intervention, aside from a possible deleterious influence of radiotherapy through stimulation of tumor cells, is too serious and far reaching to be condoned by the conscientious gynecologist.

In my article,[1] previously mentioned, I have warned against the possibility of starting proliferative changes of a degenerative character in those cell areas of a radiated myoma which are not destroyed by the roentgen rays. Undoubtedly, in the case of sarcomatous tumors of both ovaries just referred to, which was

4. Stern, S.: X-Ray Treatment of Uterine Fibroids, Am. J. Obst. 72: 396 (Sept.) 1915.

5. Deaver, J. B.: Operative Treatment of Fibromyomatous Uterine Tumors, J. A. M. A. 67: 1216 (Oct. 21) 1916.

diagnosed as myoma, the sarcoma would have been stimulated by the roentgen rays with disastrous results. The enumeration of similar instructive cases could be indefinitely prolonged. Tracy[6] pointed out some years ago, on the basis of solid arguments advanced against roentgen-ray treatment of uterine fibromyomas, that with few exceptions the only rational treatment is early surgical intervention, for a certain percentage of these tumors undergo various forms of degeneration which may positively be hastened by the application of the roentgen rays, and other myomas are complicated by malignant disease in the genital organs.

The corroborative observations of others have naturally served to confirm me in the very decided stand I have previously taken against the roentgen-ray treatment of uterine myomas, for nothing has been brought forward to cause a change of attitude on my part. I am still convinced of the superiority of surgery, and find my experience supported by that of prominent gynecologists and surgeons, both in this country and in Europe.

LIMITATIONS AND FAILURE OF RADIATION

The question of radiation versus surgery in uterine myoma was recently discussed by Cernezzi,[7] in Italy, whose findings are much in conformity with my own. He pointed out that not a few gynecologists, and the great majority of general practitioners, adopt and recommend a passive attitude, with more or less reliance on the roentgen rays in patients at or near menopause, waiting for its favorable influence on the tumor. According to these Italian statistics, there is good reason to modify this optimism, for in no less than 68 per cent. of his patients who had been radiated elsewhere, the symptoms of the myoma reappeared or became aggravated, with the result that operation was requested by the patients themselves. These statistical

6. Tracy: Pennsylvania M. J. **28**: 353 (Feb.) 1915.
7. Cernezzi, Aldo: Riforma med. **34**: 233 (March 23) 1918.

figures are of great practical importance, as the artificial menopause induced by radiotherapy is often credited with the cure of uterine myoma. It is admittedly unwise to wait for the problematic benefits of the natural change of life in the presence of well marked symptoms, or of severe and repeated hemorrhage due to a myoma.

Le Roy Broun,[3] in a review of the uterine myomas operated on at the Woman's Hospital in New York during 1918, comprising 262 cases, is led by the excellent end-result of surgery applied to a series of consecutive cases to raise the very urgent question whether this record can be equaled by roentgen rays applied for the purpose of absorbing or curing the myoma. The roentgen ray, in his judgment, should be used in myomas only for the purpose of controlling hemorrhage, and then only when the contents of the pelvis can be mapped out clearly.

The assertion that fibroid tumors disappear under the influence of radiation cannot be taken seriously, according to Deaver,[5] whose findings entirely coincide with my own. Such patients still have their tumors, although the symptoms may have been relieved. He accepts the view of those who hold, like myself, that the roentgen ray has failed to demonstrate specific power over fibroid growths, and is capable of doing great harm through delay of the necessary radical treatment.

RESULTS OF OPERATION

The surgical treatment of uterine myoma is simple, efficient and safe. The patient wastes neither time nor money, and her expectations of rapid relief are not doomed to disappointment.

In my own experience, as covered by the clinical material of the last two years in the Harlem Hospital of New York, and the last twelve months in the Lenox Hill Hospital, as well as in private practice, the surgical treatment of uterine myoma in the form of myomectomy (twelve cases), supravaginal hysterectomy

(eighty-nine cases), vaginal hysterectomy (one case), and total hysterectomy (eighteen cases), in all 120 cases, was attended by very favorable results and a low mortality.

Age of patients.—The youngest two patients were 23 years of age. Very massive doses of radioactive substances would have been required, involving a permanent loss of ovarian function. The oldest patient was a woman, aged 62, with large multiple fibroids which had undergone necrotic changes and partial calcification.

Complications of Uterine Myomas.—These were represented by a variety of findings. Needless to say, a simple diagnosis of myoma was rendered in the majority of the cases, not of accompanying pus tubes, for example, on account of the large size of the myomatous tumor.

COMPLICATIONS OF UTERINE MYOMA

	Number of Cases
Single or double pyosalpinx	26
Acute or subacute appendicitis or retrocecal, adherent appendix (not including chronic appendicitis)	18
Large ovarian cyst, single or double (including dermoid)	17
Ectopic pregnancy	1
Hydrosalpinx or hematosalpinx	12
Intra-abdominal adhesions	8
Gallstones	2

The associated complications of uterine myoma in my series of cases are given in the accompanying table. These complications occurred, single or combined, in sixty-one cases, or 50.8 per cent. This percentage is much higher than those reported by other observers, such as Tracy[6] (33 per cent.); but it is easily understood when consideration is given to the type of material we get at Harlem Hospital (a city hospital) at which the most desperate and complicated cases are received. This also explains our comparatively high mortality. We had four deaths, or 3.3 per cent., three of which occurred at Harlem Hospital in very complicated cases.

Mortality.—The entire series of 120 cases included four deaths, or 3.3 per cent.

One occurred in private practice in a woman, aged 39, with a very large myoma, large left pus tube and large right-sided ovarian cyst with many old adhesions, who died very unexpectedly on the sixth day after the operation, from acute cardiac dilatation. Her heart had been normal up to that time.

Another fatal case was one of very large multiple fibroids, complicated by early pregnancy, in a woman, aged 28, who was stuporous after the operation (total hysterectomy) and died without regaining consciousness. The actual cause of death could not be ascertained, as a necropsy was not obtainable.

A woman, aged 40, with a large fibroid and complications in the form of left pyosalpinx and dense adhesions of intestine and omentum, succumbed to hypostatic pneumonia forty-two hours after the operation.

Embolism was responsible for the death of a patient, aged 37, who, on the twelfth day following the removal of a large fibroid complicated by double pyosalpinx, cystic ovaries and appendicitis, was suddenly attacked by pains in the chest and died three minutes later.

Convalescence.—In the case of a woman, aged 40, with a large intramural myoma and many firm adhesions due to former operations, recovery was delayed by postoperative, acute dilatation of the stomach; but this was successfully controlled. Postoperative bronchopneumonia occurred in two cases. Thrombophlebitis of the left femoral vein was noted in a woman, aged 33, after supravaginal hysterectomy for multiple fibroids, which were complicated by acute salpingo-oophoritis.

Retention of urine occurred after the performance of supravaginal hysterectomy in a case of giant, multiple myoma, complicated by dermoid cyst, in a woman, aged 34. Another patient, aged 50, with a large intramural myoma and subacute appendicitis, complained of backache and passed gravel and blood following the performance of myomectomy. In a case of a large, inflamed, soft fibroid complicated by unilateral pyosalpinx in a woman, aged 30, supravaginal hysterectomy was followed by a stump exudate, which was

successfully treated by incision and drainage. Superficial cutaneous infection occurred in two instances after supravaginal hysterectomy for multiple fibroids complicated, respectively, by chronic, bilateral salpingo-oophoritis, and by adherent retrocecal abscess.

Microscopic Findings.—The tumors were plain and simple myomas in the great majority of the cases. No instance of sarcomatous degeneration occurred in this series; but this was purely accidental, for sarcoma was demonstrated in myomas shortly before and immediately following our series. Hyaline degeneration of uterine fibroids was repeatedly demonstrated, and minor changes of a hemorrhagic or necrotic type were exceedingly common.

It has been my good fortune of late to operate, in private practice, on several patients who had received quite extensive roentgen-ray treatment without having been cured by it.

One case of special interest was that of a woman, aged 34, who had been sent by a New York gynecologist to a roentgenologist with a diagnosis of uterine myoma. After receiving roentgen-ray treatment the hemorrhages stopped for a few months, only to return again with increased severity. When I saw the woman, she was very much exsanguinated, and examination revealed a uterine myoma about the size of a man's fist. She submitted to a supravaginal hysterectomy and, I am glad to say, is in excellent condition at the present time.

Another case was that of a woman, aged 40, who had previously undergone three laparotomies, one for appendicitis, one for double salpingitis, and the third for a cyst in the right ligament and right oophoritis. She had been seen by another gynecologist, who made a diagnosis of a large myoma of the uterus and advised roentgen-ray treatment. In this case, also, the hemorrhages disappeared for a short time only to return again, and when I saw the patient I made a diagnosis of a uterine myoma the size of a man's fist and advised a supravaginal amputation. This operation was performed under extraordinary difficulties because of the fact that, in consequence of the three former laparotomies, there were tremendous adhesions between the intestines themselves and between the uterus and intestines. Because of an acute dilatation of the stomach on the fourth day, the patient made a rather stormy convalescence, but is now in excellent health.

POSSIBLE CONSEQUENCES OF RADIATION

When those strong adhesions between the intestines themselves, and between the uterus and intestines, are found, it is wise to consider their bearing on roentgen-ray treatment. Fixed at one point by adhesions, the same portion of the intestine is continually exposed to the strong roentgen ray, risking destruction of the intestinal mucosa, which might in turn lead to intractable diarrhea.

In my previous contribution[1] to the subject, some space has been devoted to the occurrence of intestinal lesions as a sequel of radiation, and I have quoted a number of French investigators who produced intestinal lesions through roentgen-ray applications in animal experimentation.

In a comparison of the operative and radiotherapeutic treatment of uterine myoma, Case[8] arrived at the conclusion that the ray treatment should not be used when time is a factor, and that it cannot be used with safety in rapidly growing tumors, in fibroids complicating pregnancy or when serious disease exists in the tubes or ovaries. Mayo[9] emphasized that this type of treatment in myomatous disease is destructive, nonoperative, but not conservative. The function of the ovaries, tubes and uterus is lost in practically all cases in which uterine myomas completely disappear under this treatment. No radical treatment of myoma by roentgen rays is possible without sacrificing the ovaries, thereby exposing those patients below the climacteric age to physical and nervous changes of an undesirable kind.

At best, the radiated patient retains her tumor, although the symptoms may be relieved. My views are in thorough agreement with those of Deaver,[5] as quoted

8. Case, J. T.: Comparison of the Operative and Radiotherapeutic Treatment of Uterine Myomas, Surg. Clinics, **1**: 579 (June) 1917.

9. Mayo, W. J.: Myomas of the Uterus; with Special Reference to Myomectomy, J. A. M. A. **68**: 887 (March 17) 1917.

above, and other authorities such as Tracy,[2] Frank,[10] Mayo[9] and Case.[8]

The operation for fibroid tumor of the uterus, as pointed out by Deaver,[5] and confirmed in my own experience, is one of the most satisfactory in all surgery. The mortality in his last series of 750 operations was only 1.73 per cent. Tracy's report[2] of 100 consecutive operations for uterine fibromyoma records a primary operative mortality of 2 per cent., while mine is 3.3 per cent. for reasons given above.

According to the preceding statements, it is evident that I am still an adherent of operative procedures in the treatment of uterine myoma and do not advocate, in these cases, any form of roentgen-ray treatment except with those cases in which operative interference is contraindicated, such as chronic cardiac or nephritic cases, and in those instances my preference would be for radium.[11]

CONCLUSION

I do not deem the roentgen-ray treatment of uterine myomas a safe procedure for the following reasons:

1. It is impossible to determine whether the growth to be dealt with is a benign or a malignant tumor.

2. My statistics show that about 50 per cent. of all myoma cases are complicated by pus tubes, hydrosalpinx or hematosalpinx, acute or subacute appendicitis, ectopic pregnancy, etc.

3. In young women who have not reached the menopause, the roentgen ray is almost certain to destroy the function of the ovaries, resulting in a premature menopause.

4. The continued application of the roentgen ray is apt to have a deleterious effect on the intestinal mucosa.

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10. Frank, R. T.: The Choice Between Operation and Roentgenization of Uterine Fibroids, Am. J. Obst. **72**: 408 (Sept.) 1915.

11. In addition to the references already given, the following will be found of interest:
Moeller, W.: Fibromyoma Uteri, Svenska Läk.-Sällsk. Handl. **44**, No. 10, p. 181, 1918.
Oliva, L. A.: I raggi X e il radium nella cura dei fibromiomi dell' utero, Gazz. d. osp. **39**: 345 (May 2) 1918.

5. My experience has shown the surgical treatment to be the safest (with only 1 to 3.5 per cent. mortality), quickest, and most reliable method at our command.

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ABSTRACT OF DISCUSSION

DR. GEORGE E. PFAHLER, Philadelphia: It is quite natural that in an audience composed of surgeons and gynecologists who operate, and of whom only a few are familiar with the roentgen ray and radium results, the sentiment should be in favor of operation. I disapprove of the radical position taken by Dr. Stein. It is my practice to treat the patients referred to me by gynecologists, depending on their diagnosis. Patients coming to me without a diagnosis are advised to go to a gynecologist for such diagnosis. The great objection to roentgen-ray treatment of fibroids of the uterus seems to be the danger of malignancy and the difficulty of diagnosing malignancy. The single case which the author presented in which recurrence followed operation is a good argument against his own procedure. I have treated 150 patients and not one developed malignancy since. If from 7 to 10 per cent. of all fibroids are malignant what has become of those which I have treated by the roentgen rays? Where are the ten to fifteen cases of carcinoma that should have developed in these cases? What has become of the 200 or more cases of malignancy that should have developed in the thousands which have been treated and reported by roentgenologists? They have not developed. I do not say that to give the idea that we should be careless in diagnosis, but let us not be too radical. Let us give the patients the advantage of the best treatment. If we allow the gynecologist to decide which cases shall be treated by radium or roentgen rays we shall be on safe ground. I can give that advice to every roentgenologist. Only two out of the 150 patients I have treated had to have operations later on account of complications. These two developed pelvic abscesses requiring incision and drainage through the vagina. These two at least had this complication at the beginning of treatment. In one woman who was very fat and in whom the doctor had diagnosed myocarditis, operation was contraindicated. The other patient had a marked anemia which forbade operation. Both were inoperable cases. I do not believe that we should go to the other extreme any more than that we should say that all cases ought to be treated by the roentgen ray. The tumors do disappear under roentgen-ray treatment.

DR. J. RIDDLE GOFFE, New York: I am very glad that Dr. Stein has read this paper, for I think the whole tendency

of the discussion was in favor of the roentgen-ray or radium treatment. The operative work has not been emphasized sufficiently. I recall when operations on fibroids were very disastrous. Many of us can recall when the fatality was more than 50 per cent. We must bear in mind that during the last few years operative results have improved. Dr. Le Roy Broun has given us a record of 262 cases of fibroid tumor operated on by twelve or fifteen different men during 1918 with a death rate of only 1.53 per cent. Analyzing the cause of death we find that there were complications which would undoubtedly have been very serious following the application of radium and they might have been quite as fatal. Therefore complications are a large factor in fibroid cases and can be relieved only by operative procedures. I am in favor of adhering to the operative procedure. The dangers and discomforts of the radium treatment have not been emphasized sufficiently. In contrast, the operative procedure is more simple.

Dr. Joseph B. De Lee, Chicago: I would like to ask those who have used radium whether any woman in their practice has become pregnant after the radium treatment. In three cases in which I used radium to preserve the uterus with the view of rendering possible a pregnancy, I have not yet been able to report such an occurrence.

Dr. Thomas S. Cullen, Baltimore: I have listened with much interest to the discussion of Dr. Stein's paper particularly that in reference to the part played by the roentgen ray. One of the gentlemen has told us that there is malignancy in from 7 to 10 per cent. of the cases he has treated, and further, if I mistake not, that these patients have been sent to him by gynecologists. This percentage is far afield from what Dr. Kelly and I have obtained in a careful examination of nearly seventeen hundred cases. In about 1.3 per cent. we found carcinoma of the cervix, in 1.7 per cent. carcinoma of the body of the uterus and in 1.2 per cent. sarcoma developing in or associated with the myomas. Thus in about 4.2 per cent. we have found malignancy. In those cases where carcinoma of the cervix is present the gynecologist will, as a rule, hardly refer the patient to the roentgenologist, and in a certain percentage of the cases where adenocarcinoma of the body exists with the myoma the diagnosis will also be made. In these cases likewise the surgeon will deem operation the wiser procedure. If we deduct these cases there will remain at the outside from 2 to 2.5 per cent. where the use of the roentgen ray or radium will be considered as a factor in the treatment. Radium and roentgen ray are without a doubt destined to play a large rôle in the treatment of fibroids. In a few years sufficient data will be available to enable us to crystalize our views on the subject.

We will then be able to tell fairly accurately when to operate and when to advise roentgen ray or radium treatment.

Dr. Henry Schmitz, Chicago: I had a patient, 42 years of age, who came to the clinic suffering with severe menorrhagia. Refusing any operative procedure, she was treated by radium. Nine months afterward she became pregnant and gave birth to a perfectly healthy child at full term. The infant is now five years of age and has no defect of development.

Dr. Peter B. Salatich, New Orleans: I do not know anything about radium for fibroids, my experience being principally on the operative side. We lose very few cases by operation for fibroids and our results have been uniformly good. When we operate on a patient she generally convalesces well and that is the end of it. In many cases where radium is used, the patient is relieved partially for a time and then must go back and have the radium reapplied. I have seen two or three cases, one especially, with very disastrous results. In one case there seemed to be a friability of the tissues and the rectum was opened in separating adhesions. We had to drain and following this there was a fistula. I think radium should be limited to cases which are inoperable, when the heart is so bad that you do not care to take a chance or the patient is so anemic that you merely want to tide the patient over and operate later. I believe that syphilis plays some part in the causation of fibroids. Many cases of fibroids occur in young women and often in unmarried ones. Many married women who have fibroids are sterile. I find that a larger percentage of fibroids occur in the negro race than in the white. You find more syphilis in the negro for the same reason that you find keloids there, the cause of which we know very little about. The heart complications are frequent in fibroids. In 25 per cent. of heart cases in which you cannot get a positive history of infection you find either a positive or weakly positive Wassermann. I have had a Wassermann made in every case of fibroids in the negro and the reaction was positive. Not every negro woman, however, with a positive Wassermann has a fibroid, although the large majority having fibroids show a positive Wassermann. I merely mention this fact because we are all anxious to know the cause of fibroids.

Dr. Le Roy Broun, New York: As to the sarcomatous changes in fibroids referred to by Dr. Clark, our experience in nine years in the Woman's Hospital gives us seven cases out of 1,760 consecutive cases in which we operated, a little less than four-tenths of 1 per cent. This is in keeping with what Dr. Clark has said and is rather opposed to the figures usually stated in the literature which give the percentage as 1.5 to 2 per cent.

DR. C. N. COWDEN, Nashville: We all know what our results are in operations for fibroids. In radium treatment, however, tissue is left behind. What the future of that tissue is going to be when the patient undergoes retrograde change, say at 60 years of age, we do not know.

DR. MILES F. PORTER, Fort Wayne, Ind.: I think it important to bear in mind that on the side of the question of operation we have some adequate and definite facts. On the other side, we have some very suggestive facts. Our attitude in regard to the application of the roentgen ray to fibroids should be what it is in regard to cancer. It occurs to me that there is no question but that the proper thing to do with a fibroid, other things being equal, is to take it out. Just as we do in cancer, we should call in a consultant and if there is any reason why operation should not be done the roentgen ray should be tried. In the meantime we must not forget that it seems to be proved very conclusively that mild doses of the roentgen ray increase the rapidity of growth of all sorts of malignant tissue. It has been proved rather definitely by Kimura that mice carcinoma and sarcoma subjected to these mild degrees of radiation will grow with greater rapidity when grafted into other mice than they will when not exposed to this mild current; and, on the other hand, if they are exposed to rays of greater strength the growth is so inhibited that the grafts do not take at all. So that in the application of this method of treatment these facts should be borne in mind and the roentgenologist or radiologist should know pretty definitely whether he is dealing with a case which is malignant or one which is not malignant and the dosage should be applied in accordance with these facts. In the meantime, until we have something more definite we should go along the old lines. With a death rate of not more than 1 per cent. in uncomplicated cases, these patients should be subjected to operation unless there is some particular reason why they should be treated by roentgen ray or radium.

DR. ARTHUR STEIN, New York: Dr. Pfahler is to be congratulated on having such splendid results, but the question arises, Are these results obtained in all cases? As stated in my paper, I had three cases in which I operated after the roentgenologist had pronounced the patient cured because they had stopped bleeding for three or four months, only to bleed again much more than before. They are cured now after an operation. To my mind the whole question comes to this: We have all to improve on our diagnosis, so that we can rule out in each case with absolute certainty whether it is a simple myoma or one complicated by some other disease. If we can do that, then surely all the cases amenable to radium treatment ought to be treated by radium and not by roentgen ray.

THE TEACHING FUNCTION OF THE HOSPITAL

WITH ESPECIAL REFERENCE TO GYNECOLOGY

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From early times, hospitals which are primarily remedial have always shown a tendency toward becoming centers for the dissemination of medical knowledge. This tendency is but logical, as the eager student will naturally seek to acquire learning from the source where the great masters of medicine search for scientific truths. As a result, schools of medicine were evolved, radiating from the hospital as a center. In the present century, hospitals have increased in vast numbers and are located in every community, so that many are in no way affiliated with medical colleges. The latter hospitals are apt to lose sight of one of their most important functions, namely, the educational function.

The chief function of the hospital is, of course, the care and cure of the patient; but next in importance is the teaching function—teaching the profession at large, the staff, interns, students and nurses.

The recent movement for hospital standardization, which has been inaugurated by the American College of Surgeons, provides that these institutions shall be investigated to see if they measure up to the standards which will soon be demanded of them by the public at large as well as the medical profession. These standards should require that the staff of the hospital shall recognize as a duty their obligation as teachers,

in order that their institution may fulfil an important function of extending medical knowledge with resultant benefit to the community. Every hospital, whether connected with a medical school or not, has this duty to perform.

Clinical research can only be done in a hospital. Every hospital is a mine containing hidden treasures of scientific facts awaiting to be dislodged from obscurity by the patient seeker after truth. The obligation to humanity is obvious, and, therefore, this duty of contributing to knowledge by scientific research is one that cannot be neglected by the staff of a hospital without failure to fulfil properly its educational function.

It is, of course, a great advantage to a hospital if it is so fortunate as to have a college connection. College influence has made great strides of late, and the knowledge that the best interests of patients in the hospitals are promoted by teaching is becoming rapidly appreciated by the laity, so that affiliation with a college is now sought by trustees and considered a valuable asset to their institution. These fortunate hospitals which, owing to their being utilized for clinical instruction of undergraduate students, must perforce fulfil their teaching function in part, at least, are necessarily few in number; but the great majority of the hospitals of the country which have no such connection have nevertheless their obligation to fulfil properly their teaching function. How many of them are doing it as it should be done? How many of them are taking advantage of their opportunities? The economic waste of the vast amount of clinical material which is at hand, and is now not made use of by the hospitals of the country, is enormous, and is lost as material for imparting valuable instruction to the profession, which means of course the loss of untold benefit to the community. It is our duty as a profession and as citizens to point out to these institutions their neglect of this

important matter and to demand of them that they take advantage of their opportunities in order that they may be made to serve mankind to the utmost. Therefore, all hospitals should be teaching hospitals, and trustees should be educated to the importance of this educational function so that they will demand this work of their appointees as an essential part of their duties.

It is very true that some men lack the instinct to teach; therefore, it is the duty of trustees to appoint men who can and will teach. Teaching is a great stimulus to do better work, and its rewards are proportionate to the effort expended, and the standard of work in the hospital which gives public clinics will inevitably be raised.

The recent supremacy of Germany in the world of medicine is undoubtedly largely due to the fact that all her hospitals are teaching centers. A teaching hospital or clinic will set the standard of medical practice for the profession in its vicinity, as it is an exponent of modern science in its particular field, and its educational value can hardly be exaggerated.

TEACHING INTERNS

Edward Martin has rightly said that a doctor on graduation from a medical school is only 20 per cent. efficient as a practitioner of medicine, and that service as an intern under proper conditions may provide nearly 80 per cent. of the training of a doctor. The importance of providing a service for the intern under proper conditions in order that he may be fitted to practice medicine in the community is therefore self-evident, and the obligation of the hospital cannot be neglected without failing to fulfil this teaching function which belongs to it. It is too frequently the custom to place young men fresh from the medical schools in the hospital as interns with no supervision from any one who feels any direct responsibility for their

instruction or guidance. Too often they are expected to pick up knowledge themselves as best they can.

The staff should always have this obligation in mind, and in making rounds the intern should be made to feel that his work and responsibilities must be taken seriously; that carelessness and neglect are serious offenses which may cause material damage to the patient. He should be instructed as if still an undergraduate, and his work helpfully supervised. He should be encouraged to make his own diagnoses and to give his reasons therefor. He should be urged to consult the literature bearing on his cases, and facilities should be provided in order that he may conveniently do so. Above all, he should be taught how to take a complete and proper history, and the careful execution of this important but often neglected work should be insisted on. He should clearly understand that what operations he may be allowed to do under supervision are as a reward for efficiency and proportionate to his faithful and conscientious performance of his duties and his adaptability for the work. There is no better way to stimulate his imagination and enthusiasm than by giving him practical research problems to work out from the cases under his observation. By giving personal instruction to the intern we are not only benefiting him but are after all providing for the welfare and proper care of future patients as well as insuring the best service to present patients.

This time and trouble spent in teaching interns is not pure altruism, for much of the success of our own work depends on the intelligent interest, and conscientious performance of duty, by our assistants on the house staff.

The organization of the intern staff should provide a well balanced service insuring each intern work in every department. The discipline and proper execution of the work of the staff will be greatly facilitated

if provision is made for a resident who is the chief in charge of the staff and responsible for their conduct and duties.

In the Woman's Hospital in New York, the house staff has been organized with these ends in view. There is a paid resident gynecologist who is in control of the entire intern staff and who is held responsible for their discipline and work. He arranges for the daily work in the operating rooms, and provides for leaves of absence and substitution. All cases of serious illness and deaths must be promptly reported to him. He is in charge of all the private patients, and assists the attending staff with these cases. He is directly responsible to the chief surgeon for the proper management of the house staff. The obstetric service is also in the care of a paid resident. The service of the paid residents is indeterminate and may continue as long as their work is satisfactory. They are given larger responsibilities than the intern staff and are encouraged to utilize their opportunities for research work.

The intern staff proper comprises two divisions, each consisting of a house surgeon with a senior and a junior assistant. Their service is for one year, and they serve in each position for four months. Each junior assistant serves two months on the obstetric service, as we believe a man will be better prepared for gynecologic work if he has special obstetric training. The two divisions exchange services every two months so that each intern is given the opportunity to work with all the attending staff.

The pathologic work is in the care of two full-time pathologists with two technicians, who do the routine work of the hospital; but the junior assistant who is not on the obstetric service is expected to do whatever laboratory work may be required by the service after hours, on Sundays, holidays, and in emergencies. The senior assistants take the histories of all cases and

make and record the physical examinations. Blood pressures, complete blood counts, cervical and urethral smears, and Wassermanns, in addition to the ordinary urine examinations are required as a routine in all cases on admission. The histories of all cases admitted not later than 4 p. m. are sent to the record room to be typewritten and are expected to be in the ward in time for the next morning rounds when made by the attending surgeon. The house surgeons act as first assistants at operations and are responsible for the care and conduct of their cases.

This arrangement of the service of the house staff is made to suit the requirements of a special institution such as the Woman's Hospital, which has about 250 beds, three fourths of which are gynecologic and the remainder obstetric. The interns chosen are preferably men who have already had a general hospital service.

TEACHING NURSES

The instruction of the nurses in a special hospital is a matter that concerns the surgical staff as well as the department of nursing. The nurses come to the Woman's Hospital for a six months' special course. They must have been previously graduated from a school requiring two years' general training. Consequently, in the short period of this postgraduate instruction, it is essential that they be provided with a carefully balanced curriculum which includes a course of lectures planned to cover all the phases of gynecologic and obstetric nursing. Usually lectures given to nurses by members of the attending staff are merely perfunctory. They are frequently carelessly, or not at all, prepared and are are often postponed or skipped to suit the convenience of the lecturer. In the Woman's Hospital, these lectures are given by the junior attending staff, each member of which is required to give two lectures on assigned subjects each six months on regularly scheduled dates. The

need and advantages of having a full-time instructor whose duties require not only teaching and demonstrations, but also a thorough system of inspection of the daily work of the nurses, is of paramount importance and well repays the expense involved by the added efficiency of the nursing which it insures.

One of the most difficult problems of the nursing department of a hospital with a large attending staff is the proper carrying out of the numerous and varied preoperative and postoperative standing orders. Each member of the attending staff, including the assistants, all have their own ideas and methods which they wish used on their respective patients. These standing orders, which are kept on file in the wards, usually are compiled without any thought as to whether they conflict with the meal hours or other essential scheduled routine ward work. Their multiplicity and variety are so confusing as greatly to increase the chance of error, and with the constant rotation of pupil nurses can never be satisfactorily enforced. The ideal plan is to have but *one* set of standardized orders, which are as simple as is consistent with common sense, and which are adjusted to the time schedule of the ward routine. They should be published in such form as to be readily available to nurses, interns or students. One set of standing orders means a saving of time and energy for the nurses and interns, and reduces the chance of error to a minimum, with resulting benefit to the patient and economy to the hospital. They also greatly facilitate the training and teaching of those who may work in the hospital. We have compiled and put in practice in the gynecologic wards of the Woman's Hospital such a set of standardized orders, and after a thorough trial they have proved most satisfactory. Simplicity and clearness were the objects aimed at in their compilation, and the judgment of the head nurses in charge of the wards was the guide as to their practicability, in the endeavor to make them as "fool proof" as possible.

STANDARDIZED ORDERS FOR WARD PATIENTS AND RECOVERY ROOM PATIENTS

WOMAN'S HOSPITAL IN THE STATE OF NEW YORK, REVISED, FEBRUARY, 1919

STANDING ORDERS FOR THE PREPARATION AND AFTER CARE OF OPERATIVE CASES

The following orders will apply to all patients except Emergency Cases, Complete Lacerations of Sphincter Ani, Vesico-vaginal Fistulaæ and Rectal cases, for which special orders will be given by the Attending Surgeon or House Staff.

Pre-Operative Care

Patients will receive a full tub bath on admission except emergency or very sick cases.

A specimen of urine must be obtained from each patient as soon as possible after admission and sent to the laboratory not later than 4 P.M. If it is not possible to obtain a specimen before this time, the night nurse will send the morning urine to the laboratory the following day.

Castor-oil (1 oz.) will be given 48 hours before operation if the case is in the Hospital.

Cases admitted, or ordered to be prepared less than 48 hours before operation, do not get cathartics.

Light meals are to be given on the day preceding operation.

Preparation for operation is to be made on the afternoon of the day preceding the operattion, not later than 6 P.M.

All cases will receive both the abdominal and the vaginal preparation.

All cases are to remain in bed after preparation for operation.

Preparation on the Day Preceding Operation

1. *Shave.*—The entire abdomen and the external genitals are to be shaved commencing at the ensiform and continuing over the pubes and vulva to the coccyx.
2. Tub-bath, temperature 100 degrees F.
3. *One* soap suds enema given with a high rectal tube.
4. Wash the abdomen and external and external genitals with gauze and Tr. Green Soap and warm water, commencing at the ensiform and continuing down over the vulva.
5. Wash the abdomen first with ether and then alcohol, using sterile gauze.
6. Cover the abdomen with sterile gauze.
7. Give a three (3) quart vaginal douche of 1 : 5,000 Potassium Permanganate Solution, temperature of 110 degrees F.

NOTE—The douche may be omitted on order for cases in which there is to be no pelvic surgery.

8. Cover the vulva with a sterile pad and fasten it to a T binder.

Preparation on the Day of Operation

Not less than two hours and not more than four hours before sending the patient to the Operating Room, paint the abdomen with 3½% Tr. Iodine and cover with fresh sterile gauze; give the patient a three (3) quart vaginal douche of 1:5,000 Potassium Permanganate Solution, temperature 110 degrees F. and cover vulva with sterile pad fastened to T binder.

Cases to be operated on in the afternoon are to receive on the morning of the same day:

One Soap Suds enema given with a high rectal tube, at least six (6) hours before the operation.

On the day of operation cases do not receive nourishment or liquids within 3 hours of going to the Operating Room. Tea, coffee or broth may be given before this period.

Morphine grs. ⅙ and Atrophine grs. 1/150 are to be given per hypo. half an hour before the patient goes to the Operating Room.

NOTE—This order may be omitted for cause by direction of the Attending Surgeon.

Post-Operative Care

Days are to be counted at the completion of each 24 hours.

Temperature, pulse and respiration are to be taken every four (4) hours until the temperature remains normal for 48 hours, after which they are to be taken B.I.D.

Temperatures are to be taken by rectum for the first three (3) days and indicated on the chart by an X; after this time temperatures are to taken by mouth and recorded in the usual way. Rectal and "Drip" cases to have mouth temperature only.

A specimen of urine must be sent to the laboratory the morning following the operation.

Pain.—Hypodermic of Morphine gr. ¼ P.R.N. for pain and repeat Q.S. P.R.N. for 48 hours.

Catheterization.—Do not catheterize when Curetting or Cervix Operations only have been done, unless compulsory.

Catheterize every 8 hours or sooner for cause, until the patient can void. In extensive Cystocele operations (also Mayo and Watkins Interposition Operations) catheterize every 6 hours for 3 days, or sooner for cause.

Dip the point of the catheter in 25% Argyrol in all cases before introducing it into the urethra.

After catheterization or micturition the external genitals are to be freely flushed with a warm solution of Potassium Permanganate Solution 1:5,000, by *Pitcher Douche.*

Thirst.—Nothing is to be given by mouth for 24 hours after operation but sips of ***hot*** water; then cool faucet water in small amounts if desired. (No ice or ice-water is to be

allowed.) After 24 hours, if not nauseated, the patient may have lemon albumen water.

Diet.—After 36 hours the patient may have weak tea or coffee with sugar (*no milk*), lemon albumen water, broth or fermilac in small quantities repeating every 3 hours if desired.

After the bowels move, liquid diet, milk, broths, etc., are to be given every 3 hours until soft and regular diet are ordered by the Attending Surgeon or House Staff.

Abdominal Operations Alone or Combined With Vaginal Operations

Bowels.—The rectal tube may be left in situ for gas any time after the operation.

On the morning of the *3rd* day (or at the completion of 48 hours after operation, if the patient is uncomfortable from gas pains) the patient is to be given the following enema with a high rectal tube:

Sat. Sol. of Epsom Salts	2 oz.
Glycerine	2 oz.
Turpentine	½ oz.
Soap Suds	1 qt.

On the morning of the *4th* day the patient is to be given 1 oz. of Castor Oil followed by a Soap Suds enema 4 hours later if necessary. The bowels are to be moved each day thereafter by cathartic or enema on order.

Pitcher Douche.—The external genitals and anus are to be cleansed by the *Pitcher Douche* of a warm solution of 1:5,000 Potassium Permanganate after each micturition or defecation. No manual cleansing is to be permitted.

Vaginal Operations Alone

Bowels.—On the morning of the *3rd* day the patient is to be given a Soap Suds enema.

On the morning of the *4th* day the patient is to be given 1 oz. of Castor Oil followed by a Soap Suds enema four (4) hours later if necessary.

Pitcher Douche.—The external genitals and anus are to be cleansed by the *Pitcher Douche* of a warm solution of 1:5,000 Potassium Permanganate after each micturition or defecation. No manual cleansing is to be permitted.

Douches.—After the *7th* day a vaginal douche of 1:5,000 Potassium Permanganate Solution, temperature 110 degrees F. is to be given daily with a soft rubber catheter.

Combined Abdominal and Vaginal Operations

After the *7th* day a vaginal douche of 1:5,000 Potassium Permanganate Solution, temperature 110 degrees F. is to be given daily with a soft rubber catheter.

Drainage

All drains with their location and the date they are to be removed must be charted in red ink on the Order Slip of

the Case History. The removal of the drains will be by special order of the Attending Surgeon or House Staff.

Complications

All cases developing complications will receive special orders from the Attending Surgeon or House Staff.

Out of Bed

All cases will be allowed out of bed only on special order from Attending Surgeon or House Staff.

The First Day Out of Bed the patients are allowed to sit up for one hour.

The Second Day Out of Bed the patients are allowed to sit up one hour in the morning and one hour in the afternoon.

Thereafter the length of time out of bed is to be gradually increased, but no patient is to remain up longer than four hours in the morning and four hours in the afternoon until ready for discharge.

STANDING ORDERS FOR THE RECOVERY WARD POST-OPERATIVE CARE

The following orders will apply to all patients except Emergency Cases, Complete Lacerations of the Sphincter Ani, Vesico-vaginal Fistulæ and Rectal cases, for which special orders will be given by the Attending Surgeon or House Staff.

Beds.—The beds in the Recovery Room are to be prepared for the reception of patients from the Operating Room according to the Woman's Hospital rule.

The *Bed* must be properly warmed for the reception of the patient by hot water bottles, but all hot water bottles are to be removed when the patient is placed in the bed, unless ordered to be retained by a written order from the Attending Surgeon or House Staff.

When cases are in shock or collapse heat is to be maintained by hot blankets, which are to be renewed as needed by blankets taken from the Blanket Warmer in the small Operating Room.

Hot water bottles are to be filled from a pitcher and the temperature of the water must not exceed 120 degrees F.

Hot water bottles are never to be applied to the patient except on a written order from the Attending Surgeon or House Staff, and in every case they must be separated from the patient by a blanket.

As soon as the patient is placed in bed all wet clothing is to be removed.

The abdominal binder is to be adjusted and securely pinned. All pins are to be removed from the sleeves.

A Draw Sheet is to be placed as a restraining sheet across the abdomen but not so as to cause pressure or restrict breathing.

The Head is to be turned on one side, with a towel and basin under the chin.

The Pulse and Respiration are to be taken every 15 minutes until the patient is conscious, or as long as she is in a condition of danger from shock or collapse, after which they are to be taken every hour until patient is removed from Recovery Room.

Hemorrhage.—All patients are to be watched for hemorrhage from the incision and from the vagina, an inspection being made every half hour.

Temperature.—All temperatures will be taken every 4 hours by rectum and indicated on the chart by an X (except in cases of Complete Laceration of the Perineum and Rectal and Drip cases when mouth temperature will be taken).

Pain—A hypodermic of Morphine gr. ¼ P.R.N. for pain and repeat Q.S. P.R.N.

Catheterization.—Do not catheterize when Curetting and Cervix Operations only have been done, unless compulsory. Catheterize every 8 hours or sooner for cause, unless the patient can void.

In extensive Cystocele Operations (also in Mayo and Watkins Interposition operations) catheterize every 6 hours or sooner for cause.

Dip the point of the Catheter in 25% Argyrol in all cases before introducing it into the urethra.

After catheterization or micturition or defecation, the external genitals are to be freely flushed with a warm Solution of Potassium Permanganate 1 : 5,000, by *Pitcher Douche.* No manual cleansing is allowed.

In vaginal operations a fresh sterile vulva pad is to be applied.

Thirst.—Nothing is to be given by mouth for 24 hours after operation but sips of *hot* water (*No Ice or Ice Water is to be allowed*).

Drains.—All drains with their location and the date they are to be removed must be charted in red ink on the order slip of the Case History.

Urine.—A specimen of urine must be sent to the laboratory the morning following the operation.

Complications.—Any unusual condition of the patient is to be reported at once to the House Surgeon in charge of the case and to the Directress of Nurses.

All cases developing complications will receive special orders from the Attending Surgeon or House Staff.

TEACHING THE ATTENDING STAFF

The educational possibilities of a hospital service to the attending staff are immeasurable, and no one should be retained who fails to appreciate and take advantage of the opportunities presented. The outpatient department offers one of the best opportunities for clinical instruction to the younger men who are ambitious to attain staff appointments, but as a rule they do not avail themselves of this privilege. The work done is frequently superficial and perfunctory, and the diagnoses carelessly and hurriedly made. Clinical research is rarely attempted. This waste of opportunity is largely due to the fact that as a rule there is no supervision of the work in this department, the men being left to their own sweet will, and to the feeling that promotion is only to be attained by "pull" or favor. If it is distinctly understood that the positions of chief of clinic will lead directly to the hospital staff appointments and that the work done is under supervision with that object in view, these outpatient positions will be sought for and will attract the best type of men. If they are expected to teach undergraduate students and have a definite schedule of demonstrations which they are required to give at specified times, they will be stimulated to put forth their best efforts to the mutual benefit of all concerned.

We have attempted to accomplish this object in the outpatient department of the Woman's Hospital by such supervision and teaching. The men have been given to understand that the opportunity to obtain promotion to the attending staff is open to them in accordance with their work, but that their work must give evidence of some study or clinical research. The hospital wards, the laboratories and records are freely available for this purpose.

They are expected to take part in the weekly clinical conferences and are encouraged to follow their referred cases to the operating room and during convalescence. During the summer months when the

junior attending staff act as the attending surgeons, they automatically come into the hospital as acting junior attendings, and thus have an opportunity to develop and show their worth in the operating rooms and in the wards.

A valuable aid in observing and judging their ability is the "reference sheet" which has been established as the connecting link between the outpatient department and the wards. Each patient who is referred from this department is accompanied with a form which must be filled out and signed by the clinic chief. This contains all the data relating to the patient while in the outpatient department, including the physical findings and tentative diagnosis as made by the man referring the case. He thus places his opinions on record where they are certain to be observed by the attending staff. The third year students of the Cornell University Medical College receive part of their practical training in the outpatient department of the hospital, and each chief of clinic acts as the instructor and is required to demonstrate the various methods of diagnosis and treatment and to show as many conditions and diseases as the material may afford in accordance with a definite schedule of instruction.

The entire hospital staff, seniors and juniors, should be engaged on problems of clinical research as part of their daily duty in addition to their routine work. A necessary foundation for clinical research in a surgical hospital is the thorough, careful and complete preoperative study of the patient; otherwise any deductions that may be made are of doubtful value. In order to accomplish this it is essential that the patients remain in the hospital a sufficient time before operation to permit of the necessary examination and laboratory tests to be made. This is not wasteful of hospital beds, as the time spent will be more than saved in the end by the avoidance of errors due to hasty and incomplete diagnoses, and by the great gain to the hospital in reputation and abundance of patients as a

result of the superior quality of the work done. Trustees should realize that the usefulness of an institution should be estimated by the quality of the work done and not by the quantity, for as some one has said, "If the quality be poor, the larger it is, the worse for the public and the profession."

In the Woman's Hospital the average stay of a patient before operation is four to five days, in order that she may be properly studied. This allows of the necessary laboratory tests being made and complete history being taken, with time for the attending surgeon to check it up, and for the obtaining of consultations when needed. We have established a completely equipped gastro-enterologic department, which is a very valuable and necessary adjunct to a gynecologic hospital. This department is used solely for gynecologic cases having associated gastro-enterologic conditions, and not for gastro-enterology per se, as the work of the hospital is gynecologic and obstetric only. An appropriate form called a "consultation sheet" is provided in the case history for the recording of any consultations that may be made, which must be signed by the consultant.

Valuable information is made readily available for study by the employment of a form in the case history which we call the "wound sheet." On this sheet is recorded the complete record of the healing of the wounds of operation. Provision is made for abdominal and vaginal wounds, the site, character, nature of the operation, nonabsorbable sutures, drainage, and whether the case was clean or a contaminated one, which are charted at the time of operation. Each time the wound is inspected or dressed it must be recorded and signed by the surgeon and the character of the dressing stated. If the wound is purulent, a culture must be taken and the nature of the organism given, in accordance with the laboratory report. On the discharge of the patient the condition of the wound must be recorded. When the case histories reach the depart-

ment of records, the clerks abstract the data from these wound sheets on a card index, where each surgeon's record of the healing of his operative wounds is made readily available and is open to all concerned.

All members of the hospital staff, both seniors and juniors, in all departments, are expected to make some study as a contribution to the literature during the year. If any particular type of case is desired by any of the staff for the purpose of clinical research, all that is necessary is for him to notify the chief surgeon of his desire and object, and such material will be assigned to him in quantity sufficient for his purpose, as far as the service will allow; but he must present his results for publication in the annual surgical report of the hospital, which is made up of the scientific contributions of the staff. To facilitate this important work we have established a library in the hospital with the latest editions of the standard textbooks and the periodicals on gynecology and obstetrics, through the generosity of the board of governors, and they have also provided the services of a medical artist who is at the disposal of the staff at stated periods.

Periodic staff conferences are essential to bring the men together in order that they may get in touch, learn one anothers' points of view, and exchange ideas. Opportunity is thus presented for the discussion of problems, checking up of results, and investigating errors, all of which is bound to result in vast benefits to the hospital, the physicians, and primarily to the patients. The educational value of such conferences is unquestionable and is a stimulus to the work of the entire staff. At the Woman's Hospital, staff conferences are held each week throughout nine months of the year. They last about one hour and the usual order of procedure is as follows:

Presentation by the pathologists of pathologic material of interest which have been obtained during the week. The gross and microscopic specimens are demonstrated and brief talks on the pathology are given.

The casualties of the service are next called for. Each attending surgeon must report any deaths, infections or complications occurring during the week, and an endeavor is made to locate the cause. The details as shown by the case histories, and the testimony of those concerned is carefully analyzed in order that it may be determined as far as possible whether the fault lay with the physician, the patient, the disease or the hospital organization or equipment.

A report on the analysis of the follow-up clinic of one of the attending surgeons is next made. Each of the four attending surgeons have such a clinic once a week which they must attend in person, and once in four weeks they are required to make an analysis of the results of the cases they have seen since their previous report. This analysis must show the total number of cases seen in the clinic and the number which have been previously reported. The remainder which are to be reported are classified according to the results as successful, partially successful, and failures. The acid test for the determination of the result is whether the patient has been cured of the symptoms for which she sought relief, and not whether the operative result is satisfactory to the surgeon. The sucessful cases are disregarded, while each partially successful case and failure must be analyzed in detail and the reasons given for the classification. A free discussion is encouraged in order that the operating surgeon may have every opportunity to defend his position. Cases that have been previously reported as successful which may later become partially successful or failures must be subsequently reported with their revised classification.

Next, a report of some case of special interest is made by one of the attending surgeons in turn; thus an opportunity is given to present case history or to show the patients which have had successful results. Frequently a case presenting difficulties in diagnosis or treatment is shown and the advice of the conference is sought.

Once a month the junior attending surgeons are required in turn to give a brief summary of the recent gynecologic and obstetric literature, or to give a report on any hospital or operative clinic they may visit.

A stenographer is present during the conference who makes a complete typewritten report of the proceedings, which are kept on file in the chief surgeon's office for further study.

TEACHING STUDENTS

The teaching of undergraduate students of the Cornell University Medical College in the Woman's Hospital is given during their third and fourth years.

The third year students, after having completed a course of didactic lectures and demonstrations in

gynecology, receive practical instruction in diagnosis and treatment in the outpatient department in sections of four students.

The fourth year students, in sections, spend half time (9 to 1 p. m.) for two weeks, and full time (9 a. m. to 5 p. m.) for two weeks in the hospital. They practically receive intensive daily instruction in the subject as clinical clerks for one month, which is the most efficient and ideal method. Their course includes work in the wards, where they are taught history taking, and they make daily rounds with the attending surgeon, during which they have an opportunity to study the cases before and after operation. They witness the operations and see the specimens demonstrated in the laboratory, so that they are enabled to follow the cases from admission to discharge during their stay in the hospital. They are given opportunity to examine suitable cases under anesthesia and to see the work in the cystoscopic, gastro-enterologic and outpatient departments. This work in the third and fourth year is required of all students.

During the last term of the senior year, the students spend their time entirely in elective studies. We give an elective course in gynecology at the Woman's Hospital which provides for a group of four students working as clinical clerks from 9 a. m. to 5 p. m. daily for one month. The work is divided into two schedules. Each section of two students complete a schedule in two weeks, when the sections exchange schedules. A new group starts each month. They are required to act as second assistant at operations, and a research problem is given each one at the commencement of the work, which he is required to present at the termination of the course in the form of a thesis. These problems are worked up during the time assigned to study, and they are taught how to utilize the record room for the abstraction of facts from the hospital histories.

During the term just finished, the following problems were given to the students taking the elective courses: "A Study of the Relation of Appendicitis to Right-sided Adnexal Disease;" "A Study of Postoperative Catheterization in Relation to Vaginal Operations," and "A Study of Postoperative Vomiting in Relation to Abdominal Operations." Each student was required to present an independent thesis, although they were allowed to work in groups of two on one subject. Several of these theses were of exceptional merit and will be published in the surgical report of the hospital.

From the accompanying schedule it will be seen that in a month's course on intensive all day training under supervision in every department of such a special hospital, that the student has exceptional opportunities to obtain practical knowledge.

TEACHING THE PROFESSION

It is unfortunately true that in New York at least, many of our best clinicians, surgical as well as medical, fail to realize their duty to the profession in giving teaching clinics. Until a few years ago it was not possible for the stranger or a resident in New York to obtain information as to when he might be able to witness surgical or medical clinics without unusual difficulty. Today this has been remedied somewhat by the establishment of a bureau of information at the Academy of Medicine by a number of the profession who formed a society to provide the necessary funds. A daily bulletin of operative clinics is now issued and mailed for a small fee. This bulletin consists almost entirely of surgical clinics, as it is nearly impossible to get the medical men to do their part, although there is a constant demand or inquiry for medical clinics. Many of the surgeons make little or no attempt to teach, considering that mere admission to witness the

ELECTIVE COURSE IN GYNECOLOGY FOR SENIOR STUDENTS

SECTION A. (TWO STUDENTS FOR TWO WEEKS)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9–10 Outpatient Dept.	9–11 Path. Labt.	9–11 Outpatient Dept.	9–11 Path. Labt.	9–12 Oper. Class	9–10 Outpatient Dept.
10–12 Follow Up Clinic					10–11 Conference with the Chief Surgeon
12–1 Study	11–12:30 Cysto-scopic Clinic	11–1 Study	11–12:30 Cysto-scopic Clinic	12–1 Study	12–1 Study

INTERMISSION

2–4 Oper. Class	2–5 Oper. Class	2–4 Oper. Class	2–3 Outpatient Dept.	2–5 Oper. Class	2–3 Outpatient Dept.
4–5 Path. Labt.		4–5 Path. Labt.	4–5 Path. Labt.		
			5– Conference Surgical Staff		

SECTION B. (TWO STUDENTS FOR TWO WEEKS)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9–1 Wards	9–1 Wards	9–1 Wards	9–1 Wards	9–1 Wards	9–10 Wards
					10–11 Conference with the Chief Surgeon
					12–1 Study

INTERMISSION

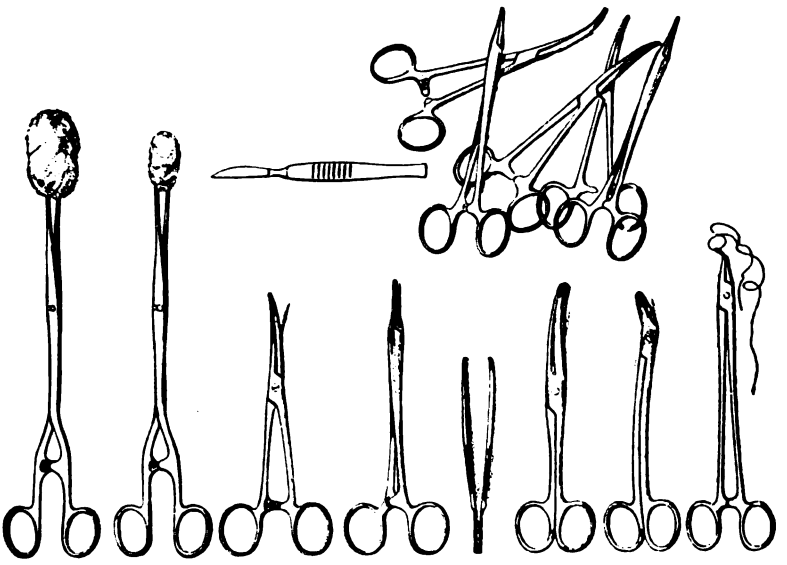
2–4 Oper. Class	2–5 Oper. Class	2–4 Oper. Class	2–4 Study	2–5 Oper. Class	
4–5 Path. Labt.		4–5 Path. Labt.	4–5 Path. Labt.		
			5– Conference Surgical Staff		

operations is all that is required. The failure to present properly the history of the case with the results of the various diagnostic tests, and the reasons for making the diagnosis and the treatment to be employed, is far too frequent. A physician referring a patient to the hospital should have the courtesy of an invitation to the operation, and the patient should be referred back to him with a copy of the diagnosis. By so doing the hospital will be fulfilling one of its functions of educating the profession. A lack of courtesy is not uncommon. A professional brother is certainly entitled to a courteous reception that makes him feel that he is welcome, for he is paying the surgeon a real compliment by spending his time to witness his work.

TEACHING METHODS

Simplification of procedure as accomplished by standardization of methods greatly facilitates the imparting of knowledge to the student in such a form as to avoid confusion and complexity, and favors its retention. Consequently we have standardized the technic of the usual gynecologic operations, and we endeavor to carry out each step of the procedures in a uniform way. Thus the interns and nurses rapidly learn the technic of each operation, and their value as assistants is proportionately increased. A description of the technic of each standardized operation is kept on file in the record room, so that in the dictation of the operation to the stenographer much time and work is saved, as it is only necessary to give the nature of the operative procedures. When the surgeon has no order or system in his method of operating, the patient's interests are jeopardized. We have had illustrations made of each step of these standardized operations, and use the stereomotograph to show the lantern slides of these while executing them, to the great satisfaction of the observers, who are thus enabled to follow each step accurately.

We have standardized the arrangement of the instruments on the operating tray, as shown in the accompanying illustration. These instruments, which are those in most constant use, must be kept in their proper location by the suture nurse. When the operator takes one from the tray, she must substitute its duplicate at once, so that the surgeon always finds the same instrument in the same place, and confusion and waste of



Arrangement of instruments on operating tray.

time is avoided. The upper part of the tray is used for the discard. The suture nurse watches the tray and not the operation, so that her duties are greatly simplified. It is therefore only necessary to ask for some special instrument. Lists of those required for each type of operation have been made so that there will be an avoidance of wear and tear on a great number of unneeded ones which would have been unnecessarily prepared.

Among our most important duties as teachers is our obligation to develop competent successors. This implies that we should give every opportunity to the younger men of the staff to develop and fit themselves for the senior positions. Many a man remains a good assistant all his life, because he has not been given the chance to do independent work owing to the selfishness of his chief.

The development of a medical center is a matter which is vitally dependent on the hospitals of a community fulfilling their teaching function in the broadest sense. If they do this, they are certain to attract those who are eager for knowledge from far and near.

The trustees of our hospitals should realize that the influences and spirit of a hospital should make not only for high ideals of its remedial function, but also for its teaching function, and that unless the proper spirit prevails within its walls, it will fail in the fulfilment of its full duty to the community. Holt has well said:

> The spirit of an institution is something different from its aims. It is the resultant of the attitude of mind, the breadth of outlook, and the personality of the three persons who determine the hospital's policy: the dominating spirit in the board of trustees, the superintendent, and the physician in chief.

71 West Fiftieth Street.

ABSTRACT OF DISCUSSION

DR. R. M. HARBIN, Rome, Ga.: During the last two weeks I have spent some time in a number of hospitals of the East trying to obtain some data as to the standardization of preoperative and postoperative treatment, and I wish to strongly commend Dr. Ward's discussion because the Woman's Hospital is the only one in which I have been able to find any systematic efforts in this direction. In several hospitals I have been referred to the house surgeon as the one most familiar with hospital treatment, and, of course, as the house surgeon changes, perhaps the treatment changes. No hospital can progress that does not develop efficiency, and as the service improves the patient's welfare is enhanced. We cannot separate these two interests. The patient should be first

and last and is coming into his own by ceasing to be merely a case, but becoming a human being.

DR. ISAAC S. STONE, Washington, D. C.: We are all watching with great interest the work of the Woman's Hospital of the state of New York. Dr. Ward's paper is timely and his suggestions are valuable and will attract the attention of all who are interested in hospital standardization. The development of the hospital intern into a member of the staff is a matter that should receive attention. His training should involve more than merely learning to operate. The appreciation of standards is demanded and all that goes toward the development of the best results for both public and profession. Of what value is a member of a hospital staff who never, or but rarely reports the result of his observations or his surgical experience? Of what value will he prove to have been to the hospital even after a service of many years? Neither the hospital nor the surgeon will acquire fame or even recognition with such work as his. I wish to commend a feature of the system practiced at the Woman's Hospital, namely, the team work of the staff. The authority of a chief surgeon seems to be the only possible way to accomplish this end. In many of our hospitals financial reasons appear to demand a large attending staff which I consider a sacrifice of scientific attainment to apparent necessity. In all such instances in the absence of a chief, the staff should agree on a method which will enable its members to unite on a leader or chief of their own selection who should in turn report to the staff and receive suggestions which may produce results similar to those attained by a chief appointed by the governors or directors of the hospital.

DR. JOHN OSBORN POLAK, Brooklyn: It has been well said that it is not the mortality which determines the success of a hospital, but the morbidity, and morbidity is dependent on certain factors that have been excellently brought out by Dr. Ward. First of all, the organization—and organization means diagnosis. Whether we cure a patient depends on an accurate diagnosis. It is impossible for a patient to come into a gynecologic service the night before and be operated on in the morning and have the surgeon know what is the matter with that patient. Each woman should have a preoperation study of her cardiac function, her renal output and the relation of her gastrointestinal symptoms to her pelvic lesion. Particularly is this so if it is an inflammatory process of long standing. It is absolutely necessary that these factors shall be worked out, and this can be done only by sufficient time for preoperative study. This means that when we operate on the patient we do a complete operation. The most illuminating lesson the surgeon can have is to see his uncured patients come back. A follow-up system can be carried out in any hospital if the chief will devote sufficient

time and study to his work and that of his assistants. We have weekly clinics for our postoperative patients at the Long Island College Hospital, so that each patient returns at monthly intervals. This permits them to return in small groups and we study the results. Each man's work is examined, has to pass criticism and a record of results is made. It is certainly humiliating to see how many failures we can produce in gynecology even when we have good anatomic and surgical results. Once a week we hold such a conference as Dr. Ward mentioned and have a report of our morbidities and our mortalities and a discussion of the cause. The result of the matter is that every week we have fewer morbidities and mortalities to report, because Dr. So and So does better work when he knows everything he does is reviewed. A very important point is the resident system. I do not believe that any hospital can be well managed without the resident system. During a part of the time of the resident's term we try to place him in other institutions or in research laboratories, so that we may know what other men are doing, and the resident comes back and teaches. This system can be carried out in a small hospital if there is an agreement to follow a unified technic and one man is willing to act as director.

DR. HENRY P. NEWMAN, San Diego: The hospital is going to be an issue in the near future. Our hospitals must be held responsible for the work they do, and their tabulated records should be accessible to the general public which has a right to know the work that is being done. That will mean better medicine, better professional standing, better training of the youth in medicine. It will take care of the rising doctor, the intern, and we need have no fear concerning the coming practitioner of medicine. He will get the training in the standardized hospital in addition to that which he receives in the standardized college.

DR. C. E. CANTRELL, Greenville, Texas: It is encouraging to come down here and hear the discussion on the standardization of hospitals because there we must give the final teaching to the men who go out to take care of sick women and children. Now one is bewildered about this matter when they begin to study the standardization of hospitals. When men cried out to stop raising the standard of teaching to a point which the people would not follow, I said we will educate the people. They said, how will you reach them. We will go to the churches. It is necessary to instruct some trustees of hospitals until they see the necessity of all this standardization, when they have been thinking only of how to get money and thinking that money is the only thing that is necessary, sometimes even selecting the place where the money should come from and talking about "tainted money" and all that. We must go and tell those men that it is nec-

essary to standardize these hospitals, that it is necessary to teach in every institution, it matters not how humble. We must get these men to cooperate with us. We are not going to stop until this thing is done. It is the duty of the medical profession to carry the real facts to the people, and even to teach them that it is necessary to put screens in their windows to keep out mosquitoes. Let every man pick out a manager of a hospital, visit him and stay with him until he is convinced.

DR. J. L. BUBIS, Cleveland: Our methods are wrong. There is not the connection between hospital and dispensary such as there should be. When a woman comes to the dispensary and complains of menorrhagia, she is sent to the gynecologic department; if she complains of headache she is sent to the medical department, etc. I believe every patient admitted to a dispensary should be sent to the various departments and in each have a routine examination. Also each hospital should have facilities for making the Wassermann test. Many women come back to the dispensary with symptoms unimproved after an operation. In many cases bad teeth or tonsils, syphilis, etc., have been the cause of the trouble. Since carrying out the routine examination in each department of our hospital we have better results for the patient and less expense to the institution.

DR. J. H. CARSTENS, Detroit: We have all been working along on this question of the standardization of hospitals. There are all kinds of hospitals and necessarily there are all kinds of standards. Something has to be done with the trustees. That is very necessary, and if the trustees have some nephew or some thirty-second cousin and that fellow is a darn fool and they put him in the hospital, how are you going to standardize him? What can you do with them? That is what I would like to know, and so you see it is a very difficult matter. Now you have other kinds of hospitals. For instance, the one I am connected with principally. That hospital is not a staff hospital or a trustee hospital. All the patients in that hospital are brought in by the attending staff. I bring in my patients and a dozen of my colleagues do the same thing. They have had a patient under observation, treated him or a family physician has had him under observation; he is seen in consultation and if necessary you take the patient to the hospital for operation, but you do not need to keep them for three or four days. If you do they sometimes get scared and run away. You produce less shock the shorter time you keep them in the hospital. I have some other patients sent to me from the country. Those I must take into the hospital and keep under observation. Those are other kinds of cases. It is a good thing to follow up cases. I insist that my private patients come to see me once in a while but with those patients sent

to me by the family physician I am only the surgeon and it is my duty to turn them back to the family physician. Those of you having patients coming into the dispensary to enter the hospital have a different problem to solve. I want to call attention to the fact that follow-up work is a good thing but there is a limit to it. If you follow up too much these patients will suffer from hospitalization. You will make them sick. You say to them, "You are all right now." If you don't, you pet them and make them hysterical, and they never get well.

DR. GEORGE GRAY WARD, JR.: The crux of the whole matter may be summed up by saying that it is necessary for us to instruct our trustees.

ALTERNATING PERIODIC OVARIAN SWELLINGS

EMIL RIES, M.D.
CHICAGO

From time to time certain abnormal conditions of the ovaries have been reported in isolated and unconnected observations, and it is my purpose in this article to endeavor to explain these and to link them up into a connected whole.

There are four types of cases which, I think, may be properly treated under this head. Descriptions of the first three types may be found in the literature, and I have encountered them in my own practice. These four types may be thus briefly described:

TYPE 1.—THE VANISHING TUMOR

On examination of a patient, a cystic tumor, at the side of the uterus, of the size of a hen's egg, or larger, is found. The tumor suddenly breaks under the examining hand. The patient may have had some irregularity of menstruation and some pain. Pus tube or extra-uterine pregnancy may have been suspected and it is feared that rupture of the tumor may produce serious results. The patient is rushed to the operating room and an incision is made. A little serous fluid (sometimes blood-stained) is found in the abdomen. Both tubes are discovered to be normal. One ovary shows a ruptured cyst, the thin walls of which on examination prove to be those of a corpus luteum cyst, with more or less lutein layer in its walls.

TYPE 2.—THE FALSE EXTRA-UTERINE PREGNANCY

A patient with more or less irregularity of menstruation, at times absolutely of the type found in extra-uterine pregnancy, comes for observation and presents

a soft cystic tumor at the side of the uterus. Other symptoms of pregnancy may be wanting or not decisive, one way or the other. The hemorrhage is most likely to suggest extra-uterine pregnancy and may be so protracted that it seems advisable to operate. Accordingly, the incision is made, but both tubes are found normal. Instead of an extra-uterine pregnancy a corpus luteum cyst in one or both ovaries is disclosed, usually with a thick lutein cell layer, often with chocolate-colored hemorrhagic contents in one or both ovaries. With the removal of the cyst or cysts all symptoms promptly cease. The pathologic examination shows a corpus luteum cyst or cysts.

TYPE 3.—THE TUMOR WHICH DISTURBS THE PEACE OF THE COMMUNITY

The patient consults Dr. A in regard to certain pains in the abdomen, with or without much menstrual disturbance. The physician tells her she has an ovarian cyst on the right side and should have it operated on. After a few days, the patient consults Dr. B for confirmation of the diagnosis. He examines her and assures her that there is no tumor at all. The patient is now thoroughly disturbed and seeks the advice of a third physician, Dr. C. He examines her and tells her that she has an ovarian cyst; that it is not, however, on the right side, but on the left side. The amount of ill feeling created between practitioners themselves and their patients by such an occurrence may readily be imagined. In a case of this kind, which came under my observation three years ago, I advised the patient to have no operation for the time being and she is still alive and well. Further observation has proved that her case comes under Type 4, as I could suspect from her story. It was owing to my observations on Type 4 that I was able to treat the patient conservatively and my colleagues with sympathy who had made diagnoses differing from my own.

TYPE 4.—ALTERNATING PERIODIC OVARIAN SWELLINGS

This type I have named alternating periodic swellings of the ovary. I gave my first description of it in 1913.[1]

This group has now been studied in over a dozen cases since my attention was first directed to it in 1906. In three of the cases I have operated and have thus secured material for pathologic investigation. A number of cases have been observed in which the condition was present in a rudimentary way. In the case of the three patients operated on, and of some who were not operated on, my observations extended over several years: In Case 1 from 1906 until the operation in 1913; in Case 2 from 1910 until the operation in 1918, and in Case 3 from 1916 to the present time. Without this protracted observation in these cases and in a number of those not coming to operation, it would have been impossible to establish this clinical entity.

REPORT OF CASES

The first case of this kind to come under my observation was one in which the picture was presented in the most pronounced colors and may therefore deserve a more extended description:

CASE 1.—*History.*—When the patient first presented herself, she was 41 years old. She had had no previous sickness. She had had a normal pregnancy, labor and puerperium at the age of 27. Her menstruation had always been regular, of three or four days' duration, with moderate loss of blood and without pain. In the summer of 1905, while on a European trip, she was taken ill with a severe inflammation in the abdomen. After several weeks of treatment she improved so far that she could return to America. A letter of the colleague who had treated her reported that she had considerable swelling of the right adnexa when she left him.

My first examination, Feb. 28, 1906, found the patient well nourished, with normal temperature, and all of her organs normal with the exception of the pelvic organs. The pelvic organs showed slight laceration of the perineum; moderate cystocele and rectocele; uterus large, hard, anteverted, movable; the right adnexa thick and adherent, barely sensitive; the left adnexa not enlarged, but not freely movable.

1. Festschrift for Prof. Freund and Ztschr. f. Geburtsh. u. Gynäk.

The conservative treatment that had been begun in Europe was continued, and the patient presented herself frequently for examination. In the course of several years the following observations were made:

March 15, 1906, the right adnexa were smaller. April 17, there was a feeling of heaviness and fulness in the right hypogastrium. The patient had just finished a copious menstruation of three days' duration. The right ovary was the size of a goose's egg. The left adnexa were adherent, but not enlarged. May 15, the patient reported that moderate menstruation had begun April 26 and had lasted three days. The right ovary was slightly thick. October 8, menstruation was reported regular. The findings were the same as last time. November 12, the right adnexa were quite small.

Jan. 28, 1907, the right adnexa were larger than a hen's egg. March 21, the condition was the same as last time. May 14, both adnexa were quite small. Menstruation was regular. June 17, the condition was the same as in May. November 8, there was pain in the back and in both hypogastria. Both ovaries were large, especially the left one, which was fully as large as a hen's egg. November 14, there was less pain. Both ovaries were small.

March 31, 1908, there was at times discomfort in the abdomen. This had been true more especially for a few days previously. Both adnexa were thick, and enlarged. Menstruation was regular. June 16, there were no symptoms. The adnexa were quite small. In October, 1908, menstruation was a few days early, and lasted three days. There was no pain. The right adnexa were larger than a hen's egg; the left adnexa were small. October 8, the right adnexa were the size of a hen's egg. October 26, there was no swelling at all. December 24, there was again pain in the abdomen. The right adnexa were the size of a hen's egg, and were slightly sensitive.

April 16, 1909, there had been pain in the abdomen for two days. There was a large swelling of the right adnexa, which appeared the size of a fist. There was a slight thickening on the left side.

In April, 1909, there was no swelling. May 12, the uterus was thick, and both adnexa were small. June 25, there was no swelling.

March 21, 1910, both adnexa were thick. Menstruation was regular. May 25, both adnexa were small. December 15, there was a right tumor the size of a fist, and a left swelling the size of a hen's egg. December 27, the left adnexa were quite small, and the right adnexa were the size of a hen's egg.

Jan. 3, 1911, there was no pain. The right adnexa were quite small, and the left adnexa were larger than a goose's egg. February 27, both adnexa were small. April 22, there

was some drawing pain in the abdomen. The right ovary was somewhat large, and the left appendages were normal. May 24, the adnexa were small. July 3, the adnexa were small.

March 18, 1912, there was pain in the right hypogastrium. Menstruation was regular. The uterus was thick. On the right side was a distinctly cystic mass larger than a fist. The left adnexa were quite small. March 27, menstruation was reported as having occurred between March 22 and 25. There was a tumor on the right side of the same size as at the last visit. April 5, the right ovary was quite small. April 23, menstruation was reported as having occurred between April 12 and 15. The right adnexa were quite small; also the left adnexa. May 28, the condition was the same as at the last visit. July 2, menstruation was reported as occurring between June 10 and 13. The left adnexa were enlarged; the right adnexa were small. December 27, the patient reported that for several weeks she had had pain in the left knee. The left adnexa showed a tumor the size of a fist. An examination of the knee revealed nothing of a pathologic nature. Menstruation was reported as occurring, Dec. 7-10.

Jan. 2, 1913, there was a swelling on the right side the size of a fist. The pain in the knee was reported as at the last visit. January 10, menstruation was reported as having extended over three days. The pain in the knee was better. On the right side the adnexa were the size of a goose's egg; the left adnexa were only slightly enlarged. January 15, there was no swelling on the left side and only a small swelling on the right side.

Operation and Result.—After the patient had thus had thirteen right and seven left swellings, of which four had involved both sides simultaneously, and after the patient had frequently had considerable pain as a result of them, I proposed operative procedure.

The case came to operation, Jan. 20, 1913. The operative findings were as follows: There was a small left hydrosalpinx. The uterus was large. There was a fibroid the size of a walnut on the fundus. There was a small right hydrosalpinx in adhesions, and a small right ovary. There was a left ovarian tumor consisting of multiple cysts with clear contents and thin walls. There were adhesions of the sigmoid to the left hydrosalpinx, of the bladder to the anterior wall of the left uterus, and of the rectum to the posterior wall of the uterus.

The operation consisted in the removal of the ovaries and tubes and supravaginal amputation of the uterus.

Inspection of the appendix disclosed a thin cordlike structure connecting the normal point of insertion of the appendix with a small white calcareous nodule at the end of which an appendix of normal appearance was seen. The cordlike structure was 1 cm. long. The appendix was removed.

The pathologic examination of the removed organs disclosed two more fibroids in the uterus, and a thick mucosa. There were small cysts with serous contents and a partially yellow, partially white wall in the right ovary. In the left ovary there were cysts of the same kind.

Microscopically the cysts were corpus luteum cysts of various sizes and varying structure as to lutein contents. The fibroids were simple white fibroids. The tubes showed fibrous condition of the folds, and no other inflammatory condition. The part of the appendix which on inspection appeared normal showed on microscopic examination complete obliteration without a trace of mucosa or follicles.

The patient made a smooth recovery. The pain in the left knee disappeared quickly and had not returned on the last examination in March, 1913. At this time the pelvis was free from tumors.

If before the operation on this patient some justifiable doubt might have existed as to whether the swellings concerned the ovary or the tube, such doubt could be excluded with absolute certainty in Case 2:

CASE 2.—The tubes of the patient had been removed in 1910. At this time both ovaries were left behind and their inspection in the course of the operation had shown the left one absolutely normal and the right one somewhat thick and containing some small cysts with serous contents. Before this operation the patient had had two swellings, one on the left side in September, 1910, and one on the right side, Oct. 6, 1910. After the operation, up to 1917, this patient had at least seven swellings on the right and four on the left—twice on both sides simultaneously. In 1917, a fibroid developed which caused severe hemorrhages and was operated on in November, 1918. At this time both ovaries were removed with the fibroid. They were embedded in extensive adhesions and contained a number of cysts with bloody and serous contents, which, on macroscopic and microscopic examination, proved to be corpus luteum cysts of various stages.

In Cases 1 and 2 the symptoms which accompanied the swelling were a feeling of fulness in the hypogastrium, a bearing down sensation, backache, and in the first case, at one time, pain extending into the knee of the affected side.

In Case 3 the symptoms were somewhat more severe and showed the connection of this type of case with Type 2 as described above.

CASE 3.—This patient had a prolapse operation in September, 1916, after the method I have described elsewhere.[2] The patient made a good recovery.

Oct. 12, 1918, she reported that she had been flowing for a month without pain, that she felt nauseated, and that her breasts felt full. A week previously she had passed something like a membrane. The examination revealed a firm tumor to the right and behind the uterus. She was put under observation and reported, November 24, her last menstruation as occurring from November 1 to 8. The tumor was unchanged. As she had been sterilized in her prolapse operation and as I had never observed a pregnancy after any of my sterilizing operations, I should have been much surprised if the tumor had proved to be a tubal pregnancy. But as her symptoms certainly pointed toward this condition and as her pain was not relieved by conservative treatment, I advised operation and carried it out, Nov. 25, 1918.

The technic of the sterilization had been perfect. The tumor belonged to the right ovary. Both ovaries were perfectly free from adhesions, the right one being almost the size of a fist, the left one the size of a hen's egg. The right tumor contained chocolate-colored fluid. The right ovary was removed entirely The left ovary had healthy tissue at the base, and the tumor was excised and the ovary reconstructed by suture. The cyst of this side also contained chocolate-colored fluid. The patient made a good recovery.

Feb. 20, 1919, the patient returned. She had had her menstruation every twenty-three days since the operation, the last time February 11, lasting six days, copiously, with clots and pain in the left hypogastrium for two weeks. Examination detected now a cyst the size of a fist on the left side. The patient was advised to use hot baths. March 3, the swelling was the size of a hen's egg. As I could be positive that it was not a case of extra-uterine pregnancy, since I had observed the complete separation of the uterine cavity from the tubes and had recently seen that there was no infected tube, I simply burst the sac by sudden bimanual pressure. The maneuver produced no pain. I observed the patient for an hour, and in the absence of all untoward symptoms, I allowed her to go home. Sixteen days afterward she was still free from pain and had not menstruated. The left appendages were of normal size.

COMMENT

This was the first case in which I have deliberately broken such an ovarian swelling, a form of conservative treatment which I had contemplated for the relief of patients in whom operation was not desirable. As I had removed the right ovary from this patient; as

2. Ries, Emil: Am. J. Obst. 77: 758 (May) 1918.

she was less than 35 years old, and as I could feel certain of the nature of the cyst, this manipulation could be risked without undue hazard. If a patient who has been observed a sufficient period of time to establish the diagnosis on a sound basis, suffers from these alternating swellings and has considerable disturbance in consequence thereof but for some reason should not be operated on, this intentional rupturing of these cysts presents a simple method of relief, if only temporary. Otherwise, if the swellings continue to return, and especially, if ultimately the ovary does not go down to normal size between the swellings, but remains large and produces pressure symptoms, then operation is indicated, in order to give permanent relief.

PATHOLOGY

While the question of treatment is comparatively easy to settle, a more difficult and interesting problem is presented by the pathology of the condition. Why do these ovaries swell? From the macroscopic and microscopic examination of these ovaries it is evident that the swelling has its seat in the corpus luteum and represents a cystic enlargement of this structure with contents of serum or blood. In the first two cases in which I operated, the ovaries were embedded in adhesions, and this suggested that the presence of the adhesions prevented the follicle from rupturing freely. But aside from the fact that everyday observation fails to show cyst formation in every case of adherent ovaries, the findings in the third case, reported here, prove conversely the possibility of cyst formation without any adhesions. However, of the cases that did not come to operation, of which a number have been observed for years presenting alternating swellings, a large majority presented adhesions.

The age at which the swellings occur was as low as 25 and (as in Case 1) as high as 48.

The relation of the swellings to the monthly periods is commonly so that the swelling is first noticed from eight to fourteen days before the menstruation and

has more or less disappeared within three or four days after the menstruation. This periodicity caused the addition of the term "periodic" to the nomenclature of the clinical entity.

Many authors have reported periodic increase in the size of ovaries which were the seat of what they called chronic oophoritis; but I have not been able to find any description of a series of alternating cases anywhere in the literature. The microscopic findings in the organs removed in my operations resemble the descriptions of chronic oophoritis contained in the literature, but I fail absolutely to see any signs of inflammatory changes in the ovaries themselves, while the adhesions found on the outside of these ovaries can readily be explained independently of the ovarian condition (for instance, in Case 1 by the presence of an old appendical peritonitis).

The changes going on in these ovaries are dependent on the corpus luteum. Their effect may be simply due to the size of the cyst producing pressure symptoms, or, what is equally important, the effect is that of faulty corpus luteum function.

CHANGED CONCEPTION OF THE VALUE OF THE CORPUS LUTEUM

We have changed our conception of the value of the corpus luteum very much. Years ago the ovary was considered useful mostly for the production of ova. The corpus luteum was not understood. It was permissible then to consider it merely as a temporary false scaffolding which would keep the ovary from collapsing after the rupture of the follicle, if I may express it so crudely. Now we know that the ovary and the corpus luteum have special functions. We might compare the female sexual tract with a clock. The ovaries are the weights which make the whole machine go. The uterus might be compared to the hands and the corpus luteum to the regulating mechanism—say, the pendulum. The periodic function of the corpus luteum, same as the periodic swinging of the pendulum, keeps the appa-

ratus in rhythmic action indicated by the rhythmic menstruation. As soon as the pendulum gets out of order, the rhythm becomes disturbed; as soon as the corpus luteum becomes pathologic, we have irregularity of menstruation in one or the other direction. The function of the corpus luteum under pathologic conditions is a chapter which must be added to the old pathology.

CONCLUSION

It may be clear now why I have enumerated several types of puzzling clinical observations. It is evident that if we have such a patient with alternating periodic ovarian swellings and see her for the first time and break her cyst under our fingers, we cannot tell what we have broken. But when we are better acquainted with the abnormal periodicity of her ovaries, we can even go so far as to rupture her cyst intentionally and with beneficial results.

It may also become clear that Drs. A, B and C were all correct in their various diagnoses of right tumor, left tumor and no tumor, and that it might be wise to remember this clinical picture before upsetting the patient's confidence or injuring the standing or wounding the feeling of our brethren.

It may also be clear now how an irregularity of the corpus luteum may affect the menstrual function so that on the first examination a diagnosis of extrauterine pregnancy may seem warranted, whereas a further acquaintance with the patient may (as for instance in Case 3) show the symptoms to be those of alternating periodic ovarian swelling.

ABSTRACT OF DISCUSSION

DR. EMIL NOVAK, Baltimore. It is interesting to note that all of the cases which Doctor Ries has reported apparently have to do with some anomaly of the corpus luteum. Certainly in the consideration of such evanescent tumors as those which he has described, it is the corpus luteum to which we would be inclined to turn first in asking for an explanation, for it is this structure in the ovary which undergoes regular cyclic changes. The first and second cases which he reported were apparently instances of corpus

luteum cysts, either ruptured or unruptured. Such cases are of great interest, because of the frequency with which they mimic the clinical picture of extra-uterine pregnancy, for they may cause delayed menstruation, followed by irregular or continuous uterine bleeding, together with the presence of a onesided mass in the pelvis. The more puzzling group of cases in which large tumors of the ovary disappear and reappear periodically, are much more difficult to explain. Certainly the important desideratum here would seem to be careful pathologic study of the removed specimens. Dr. Ries states that the specimens which he has studied showed corpus luteum cysts, either with or without epithelium lining, and the question arises as to whether these structures are genuine corpus luteum cysts, or lutein cysts, comparable to those which are seen at times in connection with hydatidiform or chorio-epithelioma. In the latter condition, both sides of the pelvis may be found to be filled with a large mass, which, however, disappears entirely when the uterine lesion is removed. Now that Dr. Ries has brought this matter to our attention, we shall all be on the lookout for these elusive tumors, and by thorough histologic study of removed specimens, some more explicit explanation may be worked out than now seems possible.

Dr. Alfred Baker Spalding, San Francisco: The author spoke of these tumors appearing on one side and then on the other, accompanied by pain. I wondered whether in going back over the cases he did not find that patients had the large ovary without pain. That has been my experience. I have seen women with ovaries such as Dr. Ries described and have unfortunately operated on some of them, removing the ovaries. I have studied them in the laboratory and invariably found not only the corpus luteum cyst but that the ovary resembled an angioma. At operation I have seen the large veins running from these ovaries to form a varicocele. I have wondered whether many of the symptoms complained of might not be due to the varicocele that occurs in the broad ligament rather than to the cyst. These patients have been very difficult to handle in the matter of giving relief. I have frequently treated them for a number of years with hydrotherapy, and I have sometimes referred them to colleagues who were using high frequency or electrical treatment, and they have been relieved. Only surgery will give such patients real relief—suspending the ovary in a hammock by bringing a peritoneal fold over the sacro-uterine ligament to give that ovary a bed. This gives relief for a time. I have reoperated on a patient who had a recurrence of a retroversion and I found that the folds supporting the ovary had become strings, like those Kelly described in his old operation of ventral fixation. With a good suspension of the fundus, however, the support of the ovary will relieve the patient of the symptoms and let the corpus luteum func-

tionate normally. So long as the patient is not in pain she does not care. Without a good suspension of the fundus forward I do not believe any support of the ovary will relieve congestion causing a variocele which is the primary condition causing the pain.

Dr. Peter B. Salatich, New Orleans: I have been making a study of this subject for several years. A patient will often complain during menstruation of more pain on one side than on the other. Examination of these patients a few days before menstruation will show the ovary to be larger at that time than a week or two after menstruation. In all cases in which I have removed both ovaries I plant a piece of ovary between the fat and the fascia and in many of these patients two or three days or a week before menstruation the ovary enlarges to two or three times the size of the piece planted. Sometimes just before menstruation the ovary will stretch and be as large as a lemon and in a week or two afterward the swelling will disappear and there will be no more pain or swelling. I had one patient who refused operation. She would have considerable pain, at times with temperature elevation. Then in two or three days there would be a discharge of pus from the vagina when the pain and swelling would disappear. This has occurred about half a dozen times, and finally the condition cured itself without an operation. You will find that the pain on the right side will come on every two or three months and that the menstruation will be more profuse and attended with greater pain than that of the previous month or two. Operation will probably show both ovaries to be cystic. The important point is that on the right side where the pain is greatest you will find that the ovary is probably worse than on the side where there is no pain. But if you are going to save the ovary on the side of which the patient complains, no relief is obtained; the pain will continue just as before. Therefore, I always make it a rule to study the patients carefully and remove the ovary on the side on which they do not complain of pain.

Dr. Emil Ries, Chicago: I wish to correct a misunderstanding. The swellings which I have described are not the swellings of an ordinary ovary, but often tumors the size of a fist or larger. There is not always pain; there may be just a little feeling of fulness. Sometimes I discover that the patient knows nothing about the presence of a tumor. The most important thing is that these tumors recur—not that there is a tumor. I am not talking of ordinary corpus luteum cysts—I am talking about returning tumors. The nature of the cysts was established by microscopic examination, of course. It is not necessary to go into the pathology of corpus luteum cysts. The important point is the return of the tumor. I am not speaking of the cyclic swelling of the ovaries mentioned in every good textbook. This is something new, not previously described anywhere.

UTERINE RETRODISPLACEMENT AND RESULTS AS A CAUSE OF REFLEX NEUROSES

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NEW ORLEANS

The association of different forms of reflex neuroses and psychoneuroses, with gynecologic cases, especially the backward displacement of the uterus, is of very frequent occurrence.

These cases often fall in the hands of the neurologist and psychiatrist at first, and drift to the gynecologist when some disturbance about the pelvis begins to assert itself. Examination discloses some form of displacement, which most probably was the cause of the trouble from the very beginning, the history showing that the symptoms began about the same time as the appearance of the menses.

Very little satisfaction is gained in referring to the literature for a possible explanation of the cause of most of these disturbances. Many of the disturbances are ascribed to the interference with the internal secretions, pressure, heredity, lack of proper surroundings, etc.

We encounter many cases in which operation effects a cure, while some are only relieved, and others are only slightly, if at all, improved under all forms of operative procedures.

Dr. George R. West says: A great symptom-complex is occurring in the economy with the menstrual molimen; pelvic congestion, swelling of the breast, enlargement of the tonsils and other glands of the neck, and frequency of the pulse rate with increase of arterial tension. During the menstrual periods, there exists throughotut the body a condition of exalted arterial pressure, and it is this nervo-vascular disturb-

ance, affecting the cerebral centers, that easily accounts for a long list of neuroses occurring with each menstruation in some susceptible females.

Examples of these somatic deficiencies are strabismus and defects of speech and hearing.

Adler has worked out an inteligible theory that is in accord with reality, and applicable without contradiction to a wider class of cases. It constitutes a workable hypothesis for the explanation of the gynecologic neuroses to which we must direct our attention. If we observe the neurotic patients who consult us, we may roughly classify them into two main groups.

(1) The smaller group consists of those who typify the essentially neurotic constitution. They either have no pelvic abnormality, or if one is present, it may be shown to have no relationship to the nervous condition of the patient.

(2) The group of neurotics encountered in gynecologic practice comprises that large number of patients in whom neurotic symptoms insure or are greatly exaggerated on the acquisition of some pelvic lesion.

In treating a neurotic woman who complains slightly or not at all of pelvic pain or discomfort, we should assume that the cause of the trouble complained of is due to the pelvic organs actual, and not imaginary. By not observing this rule, we are likely to overlook the most important cause.

Groves states that the most common and most important cause of such neuroses is that which comes from the adhesion of chronic pelvic inflammation. The discomfort may come from the immobilization of organs which enjoy free motion in the pelvis.

Another exceedingly prolific cause of neuroses is prolapse of the pelvic organs. This causes a sense of pressure and weight. Patients of the strongest nervous constitution are subject to this form of neuroses. Reconstructive surgical operations in this type

of cases are among the most satisfactory in gynecologic practice.

Dr. M. P. Graves, of obstetrics, says: It is impossible to emphasize too greatly the importance of dealing with the nervous element in gynecologic cases. In a very large percentage of patients with real or fancied pelvic disease, the nervous disturbance resulting therefrom is the conscious or unconscious stimulus that causes them to seek medical relief.

A connection between the female genitalia and the nervous system has been a matter of interest from time immemorial, as is evidenced by the etymology of the word "hysteria."

In recent time, the gynecologist and nerve specialist have shown an inclination to meet on more rational grounds and much of the old antagonism and many of the old misconceptions have disappeared.

The reactions between pelvic diseases and the mind are now regarded as entirely analogous to those that take place after disturbances in other parts of the body, and to this extent the field is greatly cleared for a better understanding of our subject.

If, therefore, in the presence of a familiar nervous syndrome, he encounters the bodily lesion with which he usually associates it, he immediately recommends an operation without further investigation as to whether the operation is really needed or not. A common example of this is seen in operating for uterine retroflexion in a patient whose chief symptom is headache. He is chiefly and of course, rightly impressed with the influences of heredity, environment, childhood experiences, and sexual proclivities. The neurologist is absorbed in the predispositional factors, and tends to overlook the important effect that acquired somatic discomforts have on the psychic.

It is quite evident that, from the standpoint of the gynecologist, our first duty in attacking the problem is to become familiar with present knowledge of the psychology of the neuroses, and then to apply this

knowledge, so far as we can, in the light of our practical gynecologic experience.

With the work of Freund began a new era for neurology. He has made of neuropsychology a tangible science, easily intelligible to the average mind, stopping all metaphysical abstraction.

Adler, like Freund, dates the neurotic constitution back to childhood and finds its causation in a thwarting of the ego-consciousness by organic defects that produce in the child a sense of inferiority.

I have classified the probable causes under four general headings. Many patients have one or more of these causes acting at the same time.

(1) Purely pressure of uterus on the sympathetic nerves causing reflex disturbances, generally cured by relieving the pressure.

(2) Cystic ovaries causing a lack of internal secretion (for in a good many of these cases we find cystic ovaries).

(3) Increased congestion of the pelvic organs causing passive hyperemia from disturbances of the return circulation throwing more hormones into the circulation than normal. Many patients seem worse about the menstrual period.

(4) These foregoing causes acting alone or by exciting a sensitive or supersensitive brain, the resistance of which is lowered by inherited or acquired syphilis or by chronic alcoholism predisposing them to nervous conditions.

1. *First Cause or Classification.*—Many patients are seen that give histories of pain in lower back, all forms of nervous disturbances, and are relieved in a very short while by correcting the malposition, either with tampons, pesaries, or by operation. This is more often found in young married women who have borne a child, and on examination, the uterus is found larger than normal. They give a negative history of any trouble before marriage. Those whose nervous equil-

ibrium is naturally unstable succumb more readily to pelvic irritation, but even those of the apparently normal or robust constitution may become the victims of some form of neuroses if the irritation should be sufficiently protracted or should be combined with other elements of physical or mental strain.

Two of the cases reported come under the first classification, for they were completely relieved by correcting the existing displacement.

2. *The Second Classification.*—Lack of internal secretion has been the subject of much conjecture in an attempt to explain some forms of nervous disturbance, especially in young unmarried girls suffering from a catatonic state. No satisfactory explanation has been given to account for cystic ovaries.

In view of the fact that Frankel maintains that the corpus luteum plays an important part in the production of menstruation, and since most patients with catatonia do not menstruate during the active period of the disease, is it not possible that the trouble might originate from the disturbance of the internal secretion of the corpus luteum?

I recently gave treatment in two cases diagnosed as catatonia by the nerve specialists who saw the cases in consultation. Both patients had retrodisplacements of the uterus. One was a young woman about to graduate from one of the universities and seemingly in perfect health. There was no apparent trouble with menstruation. The uterus was retroverted, but not sensitive and she did not give a history of pain in the back nor pain during menstruation. Several members of her family are of a highlv nervous temperament, and have been under treatment at different times for some nervous disturbance. It is likely that heredity might play an important part in the causation of these nervous disturbances. There may have been irritation from the displaced uterus or the lack of internal secretion may have acted on a predisposed sensitive nervous

system. This patient was improving when I last saw her, but she had not menstruated.

The other case was under observation for five years before developing this trouble. Examination when first seen showed retrodisplacement of the uterus and double cystic ovaries. All her pelvic organs were extremely painful at each menstrual period. She suffered excruciatingly and her nervous condition was always worse at this time. Preparation had all been made to operate, and she was sent to an institution. She was kept there for a few days to build her up before the operation. About one week after entering she developed symptoms of catatonia which gradually increased and were fully developed in about three days.

It was not possible to operate, so I used douches and tampons to relieve the pressure of the uterus, but she fought and resisted so that they had to be discontinued. I gave her some capsules of corpus luteum when the condition first started, but without any benefit. Her family history shows that several members of her family have had different forms of mental trouble. One had to be placed in a retreat, but fully recovered after a few months treatment.

A Wassermann test was taken, but both the Wasesrmann test and Tschernogowbon's reaction were negative.

I placed her on five drop doses of sodium iodid, and then repeated the Wassermann, which reaction was faintly positive. I gave her a dose of arsphenamin, and she seemed to be benefited. I then gave her a second dose in one week, and three weeks afterward one more. After the third dose, she improved so that she would take her food and medicine by mouth. Previous to this, she had to be fed by catheter introduced through the nose. Her strength improved, and she walked around. Her mental condition did not return to normal.

Having tried the corpus luteum with apparently no benefit, I started her on 5 grain tablets of thyroid

extract. After taking them for three weeks, she menstruated, the flow being more profuse than at any other time. She always had scanty menstruations, showing some disturbed function of the ovaries. Immediately after menstruation, her condition changed completely. She became perfectly rational and quiet, the change being perfectly marvelous. The change was so complete that it seems reasonable to conclude that the internal secretion of the ovaries must play a strong part in these catatonic conditions.

In the treatment of clinical symptoms resulting from ovarian insufficiency Frankel uses tabloids prepared by him from the corpus luteum of the cow. He obtained better results by this method than by the employment of ovarian tabloids. My use of stock tablets of corpus luteum in these different forms of mental disturbances has been without much result.

Many patients suffering from hypofunctioning ovaries may give the symptoms of menopause, and this condition may act as an exciting cause to disturb a diseased brain. These patients are often benefited when placed on ovarian substance.

In September, 1918, I performed a double oophorectomy on a young cloistered nun for cystic degeneration of both ovaries. She suffered continuously from pain in the pelvic region and her menstruation was generally scanty. Her pains and nervous symptoms were always increased at the menstrual epoch. I placed a piece of ovary in her abdominal wall between the fat and fascia. She menstruated three days after the operation, the flow lasting five days. She did not menstruate again until February, when the flow lasted seven days and was rather profuse. She has menstruated regularly from five to seven days, every month since February. About one week before, and during the flow, the implanted ovary swells to about three times its size. After menstruation, it subsides and can hardly be felt. This method has been used in all cases in which both ovaries have to be

removed during the menstrual period. In no case has the patient complained of the flushes and nervous symptoms generally complained of when both ovaries are removed, causing artificial menopause.

I had several Wassermann reactions made on this patient with the hope of finding some cause for the cystic ovaries, but all were negative. I afterward treated the father who was suffering from retention of urine, due to prostatic enlargement. He denied having had any venereal disease. A Wassermann reaction was made and was positive. The fact of the father having syphilis might have some bearing as to the probable cause of the cystic condition of the patient's ovaries and symptoms after operation. About forty days after operation, she complained of pain in the region of the implanted ovary. I placed her on the mixed treatment and she experienced immediate relief.

Another probable cause for cystic ovaries might be increased sexual excitability without gratification. We find many young women shortly after marriage seeking relief for nervous symptoms and pains in the pelvic region. On examining, we find cystic ovaries without any other pelvic complications.

Occasionally, we encounter cases simulating epileptic attacks that might have their origin in the pelvic organs. I gave treatment in a case recently that strongly pointed that way.

REPORT OF CASES

CASE 1.—Miss M. consulted me for attacks of epilepsy. I saw her in some of these attacks. They were not typical epileptic attacks. She would be sitting at the table, or lying down, and have light movement; she would lose consciousness for a few seconds. When she regained consciousness, she complained of feeling tired. The attacks were especially marked about the time of her menstrual periods. She also suffered from toxemia; her face was covered with acne vulgaris. Pelvic examination disclosed the uterus retrodisplaced and very sensitive; both ovaries were cystic and painful. In the knee chest position, I corrected the displacement. She was told to assume this position each day for fifteen minutes.

and douches were ordered twice daily. She seemed to be very much benefited by this treatment, her attacks being farther apart and much lighter. Her history showed that she developed these attacks at about her seventh year, so I thought of some other general or hereditary condition acting as a predisposing cause, but none could be found. The Wassermann reaction was negative. She refused operation.

We meet some patients who are more nervous and complain more some months than others. They tell you they have pain every month, or sometimes none for two or more months, but almost always on the same side. At operation, we find that the side they complain of mostly during menstruation shows more disease than the other, and the rupturing of the graafian follicle on that side would account for the pain by reason of the further stretching of the already diseased organ giving rise to pain. In operating, we should be guided by this, as to which ovary should be saved if only one is to be left in.

3. *The Third Classification.*—The condition in which there is a hyperfunctioning of the ovaries. We should study carefully the history of the patient at the time of menstruation, whether the menstruation aggravates the trouble, or whether the nervous symptoms are more pronounced just before the menstruation comes on, and also if the condition is relieved when the flow is well established, and for a few days afterward. This might throw light on the trouble as probably due to a congested state of the pelvic organs, causing increased irritation or throwing more secretion into the circulation at that time than normal.

4. *The Fourth Classification.*—The condition in which the pelvic trouble acts by irritating a sensitive brain predisposed by some associated general disease. The subject of predisposition leads us to the consideration of another type of gynecologic neurotis which is represented by patients who have a well established neurotic constitution, and in whom nervous symptoms have been greatly intensified by acquiring some gynec-

ologic disability, such as prolapse, retroversion, tumor, etc. These are the cases in which careful consideration is necessary. When once it has been established that the existence of the pelvic lesion is definitely producing in the patient's mind a sense of physical incompleteness, the duty of the surgeon is to perform such an operation as will restore the patient to somatic integrity.

If this is skilfully and completely done, there need be no fear of postoperative nervous shock, but, on the other hand, a relief of symptoms may be confidently expected.

Dr. A. H. Gordon, of McGill University, directs attention to the fact that in the past few years many so-called neurotic persons who were thin and weak and nervous, who have been repeatedly examined physically, and declared to be free from disease, have been rescued for proper treatment by the Wassermann and tuberculin reactions, proving that they were sufferers from chronic infections undiscovered until diligently searched for.

CASE 2.—Miss S., whose family history was negative, up to the age of 15 was apparently very healthy and well developed. Being the only child, she took the part of the boy and girl of the family. She was fond of athletic exercises and developed a good physique. This might have helped to cause her trouble, as many girls who play basket ball and take part in other strenuous forms of exercise occasionally complain of pain in the lower lumbar region, due to some form of displacement. She commenced to menstruate at 15 years. Everything seemed to be normal; there were no pains, clots, nor profusion. When about 17, she began to develop some nervous disturbance. This continued and grew worse, and she would be violent at times, scream out aloud, and apparently have all the symptoms of insanity.

A nerve specialist was called in and he diagnosed the case as one form of insanity. He treated her for several months, but she did not improve. The pelvic organs were never suggested as probably having some relation to the cause of the disturbance. The nerve specialist decided that the case was incurable, and advised placing her in an institution. While the question of sending her away was being considered, I was called in consultation and advised a pelvic examination.

This disclosed a marked retrodisplaced and a very painful uterus. I advised giving her the benefit of gynecologic treatment before moving her to a retreat. The uterus was straightened, and the vagina was tamponed. After one week's treatment, the patient's condition began to improve, and in about three weeks she was completely relieved of her nervous symptoms. She afterward married, and at the last writing, she had not had any return of her former trouble.

CASE 3.—Miss B., aged 20, suffered from a spasmodic tic. This case has an international record, for the patient consulted several men in different parts of the United States and abroad,different causes being suggested as a possible reason for her trouble, and many different forms of treatment were suggested. Her family history was negative. She consulted me in March, 1912. As far as she could remember, her trouble first began about the time she commenced to menstruate. She described it as a shock or sensation that would seem to crawl up her spine and affect the muscles of her head, neck, and shoulders, causing her to move these muscles violently. At times, she could hardly keep her hat on. She was a pretty girl and rather popular, and would always arouse the sympathy of her friends wherever she went. Feeling that her trouble was of reflex origin, I examined her carefully for some possible point of irritation. No trouble could be found outside of her pelvis. A careful history of her menstruation was taken. She menstruated for eight days; the flow was rather profuse and always contained many clots. It would be very painful about the second day, when she would pass most of the clots. She seemed to be more nervous and to move her head more about the time it would make its appearance. I suggested a vaginal examination, to which she consented, being anxious to do anything to obtain relief. She was beginning to feel that her trouble was incurable. Examination showed the uterus painful and in a marked retrodisplaced position, and firmly fixed. Both ovaries were cystic and very painful; no amount of manipulation could dislodge them. Not being positive that this was the sole cause of all her disturbance, I tamponed the vagina, using the knee chest position. After two weeks' treatment, she seemed to move her head less, and her mother remarked that she moved but very little now in her sleep. She would move almost as much during her sleep as when awake. Feeling that I was on the right track, I suggested an operation. After two months' consideration, her family consented to operation. May 5, 1912, I performed a curettage, and then opened the abdomen, using Pfannenstiell's incision. The uterus was firmly fixed by adhesions to the rectum. These were freed by sharp dissection. Both ovaries were cystic and adherent to the pelvic walls. Half of the right ovary was removed and the cysts in the left ovary, being small, were punctured. After operation, she did not

move her head any more, and she improved very much in health. Her menstruation after operation lasted three to four days, contained no clots, and was not attended with any pain. I sew her recently and she is still free from any movements.

ABSTRACT OF DISCUSSION

DR. E. E. MONTGOMERY, Philadelphia: While I would not discount the proposition that many neurotic patients can be greatly improved by surgical measures for uterine malposition, indeed the capable neurologist is desirous that any source of irritation may be corrected in the interest of his patient, it is difficult to realize that a uterus weighing less than one ounce, in retroflexion should produce pressure on the pelvic nerves, or with its abundant supply of vessels interfere with the return circulation. It is only when complicated by inflammatory conditions producing weight that symptoms arise. Many women with uncomplicated retrodisplacement present no symptoms. With inflammation symptoms arise which demand relief but are a result of the complication and not of the displacement. In neurotic cases, where the disturbance is a form of insantity, it is often of a cyclical character and profound impression may afford temporary relief. I well remember a woman suffering from fibroid tumor. She had been long confined in an insane asylum because of suicidal tendencies. I did a hysterectomy and had to keep her in a straight jacket for three weeks subsequently. Her mental difficulties disappeared entirely so that she was regarded as cured and continued in good health until a recurrence of the insanity followed in three years and she took her life. Relief in such cases is not cure but the interval in a cycle. In no other line of work is it so important that the gynecologist and the neurologist should work together. It is exceedingly unpleasant to promise a favorable result and subsequently discover that degenerative changes exist which preclude improvement. A careful investigation by a competent neurologist will often spare the patient an unnecessary operation. The neurologist is ever ready to secure relief from every source of irritation in promising cases. I began operative work when the removal of the ovaries was a popular procedure. The occurrence of epilepsy, migraine and various manifestations at the menstrual period were considered as justification for the removal of the ovaries. Later observation disclosed that the increased arterial tension at the approach of menstruation led to the occurrence of any nervous disturbance to which the patient was subject. Any relief of nervous manifestations in such cases was only temporary. We had the ignominy of having done an unnecessary operation which entailed a train of symptoms worse than those for which it was undertaken.

Dr. Charles Ober Kepler, Boston: Recently I saw a young woman, 26 years of age, very intelligent and apparently well poised, whose family history was unimportant regarding mental or nerve troubles for one or two generations. In childhood she came into very close contact with an uncle who had some sort of stomach trouble. He was subject to very frequent attacks of vomiting and these produced a profound impression on this child. She became absolutely horror stricken, even hysterical, if any member of her family vomited and she had the most intense terror lest she herself might have a vomiting attack. She had also tremendous fear of crowds. She was of an athletic build but could not walk any distance. She was especially fearful of high places. At her menstrual periods she had no pain or backache. Her heart and lungs were normal; the right kidney was in a second degree prolapse. There was moderate general ptosis. The uterine body was retroflexed and in complete retroversion. It was apparently held in the culdesac by moderate adhesions and was only slightly mobile. I operated and found that the uterus was held down by some slight adhesions, which I broke up. The ovaries were noncystic. As it seemed as if the crux of the whole matter was in holding the uterus firmly up, I suspended it with medium kangaroo tendon. This held securely. The appendix had some slight adhesions and was removed. After the operation there was absolutely no vomiting nor has there been any since. The patient made an absolutely perfect recovery.

Dr. Emil Novak, Baltimore: Dr. Salatich's paper takes us back to a bygone period in gynecology when many nervous and mental symptoms were attributed to such simple lesions as lacerations of the cervix and perineum. It is generally conceded, I believe, that pelvic diseases in women may play a rôle in causing or exaggerating nervous disorders. There is much less danger of minimizing this relationship than of becoming too enthusiastic over it, as I believe Dr. Salatich has done. I am inclined to agree with Dr. Montgomery, that when nervous or psychic disorders are benefited by the correction of simple pelvic lesions, the improvement is more frequently due to the psychic upheaval than to any structural correction. I have never seen an insane patient cured by such an operation as simple suspension, nor does it seem rational to believe that such a disorder as dementia praecox could be directly influenced by such a procedure. I believe also that Dr. Salatich has attributed too much importance to the rôle of syphilis in cases of ovarian disease. Certainly there is no real evidence for attributing cystic disease of the ovary to syphilis. In many matters gynecologic opinion has from year to year swung back and forth like a pendulum. In the matter under discussion, however, the trend of opinion in recent years

has been distinctly in one direction, and I do not believe that we shall ever return to the old idea that insignificant pelvic disorders are the cause of all manner of mental and nervous diseases in women.

DR. RUFUS B. HALL, Cincinnati: I wish to condemn the paper. In the earlier periods of gynecology many operations were done hoping to cure nervous diseases in women. Those of us who were active at that time will recall many unpleasant experiences in operating in this class of cases with the hope of effecting a permanent cure of their nervous condition. Many cases looked promising, and in many cases in which there was real pathology and in which inflammatory conditions were corrected the patient made a prompt recovery from her nervous condition for one, three or five months, even for a year and more, but in every case there was a recurrence of the nervous condition. In not a single exception, in my experience, did the patient remain permanently well. Therefore, I soon came to the conclusion that I would operate only when the pathology justified operation and under no other circumstances. I think we should raise a word of warning against letting a paper like this go out which gives a hope of curing permanently all these nervous patients. I would emphasize one other thing, that we have a right, and that we should operate where the pathology justifies the operation, whether or not the operation cures the nervous manifestation. If the pathology disables the patient we should remove that pathology, but not with the hope that we will cure the mental disturbance. This we should attempt to do afterward under the guidance and with the cooperation of the neurologist.

DR. J. H. CARSTENS, Detroit: There is no doubt that a retroflexed uterus does produce a certain kind of symptoms. Sometimes you cure headaches; sometimes you don't. Why? Because, as Dr. Salatich says, back of this symptom is syphilis or something else, and you have not recognized the trouble. If you treat the syphilis you cure the patient whether you relieve the retroflexed uterus or not. So the whole question is one of diagnosis. It is difficult always to make a diagnosis because a woman sometimes has many different kinds of diseases. Nervous trouble may come from bad teeth, infected tonsils, adherent ovary, etc. The difficulty is to find the pathology. You must remedy all these things. I think we are justified in operating, but it is better not to be too sure about the prognosis. One thing in this whole subject that "makes me tired," as the high school girl would say, is the practice of operators, and especially of the inexperienced men, of operating to relieve women of all kinds of symptoms, and the talk about removing "cystic ovaries." Cystic ovaries cause no trouble at all, as a rule, and I decidedly object to having them removed.

DR. ISAAC S. STONE, Washington, D. C.: I fear there is one point which will escape discussion this morning and I therefore take the liberty of calling attention to the study of the psychologic side of these conditions. A young woman, married five years, the wife of a man in very good circumstances, was anxious to have children, yet had never conceived. She had been told by a number of physicians that she had certain diseases which required an operation. She came to me with the view of having an operation done for retroversion. The man who sends a woman for operation with a list of nervous symptoms which he has not worked out and which he cannot prove to have been associated with retroversion, is placing a great responsibility on the gynecologist who will operate because the operation has been suggested by the family physician. And these family physicians are getting very determined in their ideas about operations. I think the furore for operations is more pronounced among the family physicians and general practitioners today than among the men of experience in gynecology and obstetrics. Suppose I had operated on that woman without having studied her condition? I would have lost all of the influence on her that experience taught me of the psychologic side of these cases. The most important thing I have learned is, not the technic of the operation alone, but the effect of the operation with the study of the case before operating. In this case I did not suggest operation at once, but urged that we try replacement of the uterus with a pessary. The woman came back four months after I had put in a pessary, feeling perfectly well and four months pregnant. She had a psychologic and physiologic cure.

DR. PETER B. SALATICH, New Orleans: I did not claim to use the operation as a panacea for all nervous disturbances. Dr. Montgomery brought out a point about neurologists. Most of these patients had been treated by neurologists and then came to me. I first tested them out before operating to see whether replacement would correct the nervous symptoms. If there is no relief, I then suggest operation. I agree with the statement that in many cases we have no result from operation simply because there are other conditions present. Care must be taken to obtain the personal and family histories. I have used pessaries many times and do not suggest operation until I know the condition will not be relieved otherwise. Dr. Novak referred to insanity. I did not claim to relieve any case of insanity by operation for retroversion of the uterus. The only case in which I mentioned insanity was one in which the neurologist had diagnosed dementia praecox. I corrected the retrodisplacement in that case by pessary and tampon, and the woman was relieved. She refused operation. Several men referred to operating at once. When a patient comes to me I always make a careful study of the case for a long time.

DESIRABILITY OF PREVENTING STERILIZATION IN YOUNG WOMEN

WHEN OPERATING FOR TUBERCULOUS PERITONITIS

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DETROIT

Tuberculous peritonitis generally occurs in the young, principally in women, although it may affect either sex. After considerable experience with abdominal operations, I have found that tuberculous peritonitis is usually cured by a celiotomy. The simple opening of the abdomen without anything else being done, nothing being removed and no irrigation being instituted, has sometimes resulted in a cure. At other times, complications have been found which had to be remedied. Often the operation was performed for pus tubes, which were very properly removed on account of mixed infection.

It has become a custom with some surgeons when operating for tuberculous peritonitis to remove the tubes whether there was mixed infection or not, simply in order to close an avenue for the entrance of tubercle bacilli, which were supposed to be poured out from the end of the tube into the peritoneal cavity. I have protested against this practice for many years, because the tubercles in the peritoneum are all absorbed in the course of time, and it is my belief that the tubercles on the tubes and uterus would likewise be absorbed.

It has been asserted that in operating for appendicitis, it is often found that the trouble is of tuberculous origin. In that case I always remove the appendix, and I should also remove the tubes if the nidus of the

disease seems to be there. It is at times very difficult to tell where the original infection was, or where the disease in the peritoneum started. There may be big masses of tuberculous deposits, even in the omentum, some of them solid and from 2 to 3 inches in diameter, but I never remove them nor do I take any other action. They all disappear in a remarkable manner by simple opening of the abdomen. I remove the appendix in all these cases, because the appendix is a dangerous organ to leave behind. As the result of the tuberculous infection, adhesions, twisting, and kinking of the appendix often occur, which in the future are liable to cause an acute inflammation of this organ even after all tuberculous deposits have disappeared. In the case of the tubes this danger does not exist. The patients are nearly all young women, perhaps unmarried, or married only a short time, and to remove the tubes and thus deprive them of the opportunity of motherhood I consider a bad practice.

ORIGIN OF TUBERCLES IN THE PERITONEUM

As to the origin of the tubercles in the peritoneum, on the appendix and the tubes, they are brought in and are deposited there from the lymph channels. Some of them may pass from within the intestine by a process of diapedesis into the peritoneal cavity. Most of them are probably absorbed into the circulation and are deposited. These tubercles may differ from those usually affecting the lungs. They may be, as many think, of the bovine kind, such as are also supposed generally to affect the joints of children and to be due to drinking milk from tuberculous cows.

This tuberculous trouble of the peritoneum seldom comes from the vagina and uterus, and is not poured out of the end of the tube. In fact, such a case has never been demonstrated. I have curetted several hundred patients. I have had them all examined microscopically, and in only one case was there a tuberculous

condition on the mucous membrane of the uterus, and that was in a woman, aged 55. I have also seen only one case of tuberculosis in the vagina.

SYSTEMIC ORIGIN OF TUBERCULOUS PERITONITIS

One point I want to make is that tuberculous peritonitis is of systemic origin, and does not come from the outside through the tubes; hence, there is no occasion to remove and close them.

Another point I want to bring out is that, whereas there are thousands and thousands of tubercles deposited in the peritoneum in large bunches, even on the omentum, forming hard, firm tumors from 3 to 4 inches in diameter, all these are rapidly absorbed after a simple operation without any apparent trouble. If nature takes care of all the tubercles in the peritoneum and omentum, the dozen or two that are on the uterus, or on the peritoneal covering of the fallopian tubes, will also be taken care of, and the woman will be restored to perfect health with all her generative organs in good condition.

INDICATIONS FOR THE REMOVAL OF THE TUBES

The only case in which the removal of the tubes is justifiable is when another kind of infection has also taken place in the tubes, and they have been closed either before or after the tuberculous deposit in the peritoneum has taken place. Then we are obliged to remove the pus tube completely in many cases, and there is no reason why we should not do that even though the patient has a tuberculous peritonitis. But even in these cases, we sometimes merely resect the tube or some part of it, with the view of possible pregnancy in the future, and we can do this also in some cases with the disease under consideration.

REPORT OF CASE

Mrs. P. T., aged 28, operated on by me, July 27, 1916, for tuberculous peritonitis, made an excellent recovery, gained rapidly in flesh and blood, and menstruated normally until

April 13, 1918. September 1, she felt life, and was delivered, Jan. 25, 1919, by Dr. A. R. Moon. She had a retroverted adherent uterus, and had had no children. When operating for this condition I found she also had tuberculous peritonitis.

I had one other case in which I operated, July 16, 1918, and in which the patient became pregnant in January, but aborted.

These cases show that after a conservative operation for tuberculous peritonitis, women may become pregnant; hence, no woman in the child-bearing period should be sterilized unless there are other causes than tubercles in the peritoneum.

DIFFICULTY OF THE DIAGNOSIS

The difficulty of making the diagnosis is well known. I often find symptoms and indications that there might be such trouble, and when operating find some other kind of infection in the tubes. In other cases in which I simply operate for displacements and adhesions, I suddenly run across a tuberculous peritonitis.

AUTHOR'S METHOD OF OPERATION

All physicians differ in their technic more or less, and I do not know that the differences are very important. In my earlier cases I washed out the peritoneum with a 1:10,000 mercuric chlorid solution. A quart of the solution is poured in, the opening is closed with the hand, and the body is shaken so that the fluid comes in contact with every part of the peritoneum. I think this irritates and stimulates the peritoneum—probably produces phagocytosis. I do not know whether the mercuric chlorid does any good, but I know it does no harm, as I empty the peritoneum and then put in a saline solution—gallons and gallons of it—and wash the peritoneum out thoroughly so as to be sure that there is no mercuric chlorid solution left behind to produce poisoning. I then sew up the abdomen with No. 2 plain catgut in layers, closing first the peritoneum, then the muscle, and then the fascia with a

running suture. I never sew up the skin. I use sterile adhesive plaster, and the wound generally heals promptly. Formerly, I used silkworm-gut or silk sutures, but as these act as a drain, and in the tract of each suture a deposit of tubercles made its appearance, and each stitch hole showed a dark red spot as seen in healing or healed tuberculous sinuses, I stopped this method of closure. Drainage of the wound is not considered, because it first of all does not drain, and secondly, is liable to result in the development of fistulas and ulceration of the bowel.

CONCLUSION

If nature will remove the myriads of tubercles in the peritoneum in whatever part they may be, nature will also remove the few that can be found in the tubes, and the latter need not be removed on that account, and the women be thus needlessly sterilized.

1447 David Whitney Building.

ABSTRACT OF DISCUSSION

DR. J. SHELTON HORSLEY, Richmond, Va.: Not many years ago every surgeon had his own particular pet method of treating tuberculous peritonitis. One would let the sunlight in, another put in drainage tubes and still another would have his own mixture of dusting powder. The peculiar part of the matter is that nearly all the patients got well. This is not due to the particular method used but to the fact that each man was unconsciously working on the principle of producing hyperemia, which is the enemy of tuberculosis. When Dr. Carstens opens the abdomen and manipulates the intestines he induces hyperemia, and this conduces to the recovery of the patient. As to drainage it is not so much what the drainage drains; a solid rod is as good as a tube. In pyogenic peritonitis drainage is more biologic than mechanical; most abscesses are drained uphill and patients get well from appendiceal abscess drained uphill as readily as do those drained by the culdesac, because the drainage tube acts as an irritant and causes a reversal of the lymph circulation to extrude the tube. In tubercular peritonitis the drainage promotes hyperemia and that assists in curing the tuberculosis. Mutilation of the patient by taking out the tubes because she has tuberculosis does not remove the pathology and is unnecessary.

DR. J. H. CARSTENS, Detroit: All I want to plead against is this everlasting removal of tubes and the sterilization of women for every little measly thing that might be the trouble. I decidedly object to that as it is bad practice. When a person has tuberculosis of the lungs or some other organ of the body, you do not remove those organs; you treat the patient systemically. Why should you not do that in this kind of a case? The bacilli are killed and then disappear.

THE SPECIALTY OF OBSTETRICS

PRESENT STATUS, POSSIBILITIES AND IMPORTANCE

HENRY P. NEWMAN, A.M., M.D., F.A.C.S.
SAN DIEGO, CALIF.

What I have in mind to say, in response to an invitation to appear upon this program, is the outgrowth of a discussion which took place at a joint meeting[1] of this section and the Section on Nervous and Mental Diseases in New York at the June meeting (1917).

At that meeting a paper entitled "The Influence of Labor on the Brain Development of the Child" called attention to the very great responsibility resting upon practitioners of obstetrics for the prevalence of serious brain lesions due to faulty delivery, to prolonged labor, to the use and non-use of forceps with compression of the child's head, contusions and other grave injuries.

It charged the obstetricians wtih negligence in the use of forceps and with lack of proper appreciation of the seriousness of the situation both as regards the individual and the state.

In the discussion which followed there was quite general agreement as to the author's premises, which, as a matter of fact, had many times prevoiusly been put forward by men in the same field. It is no new fact that so many women are sacrificed every year to the incoming generation and that so many babes are lost or maimed in body or mind, that apprehension of the event and the future is a common attitude among parents.

Long ago I pointed out how large a percentage of life was sacrificed in labor; 7 per cent. mortality for

1. Sixty-eighth Annual Session of the American Medical Association, New York Meeting, June, 1917.

infants it was then, and over 60 per cent. morbidity for mothers; and though there has been advancement in the interest of the child to reduce birth mortality to about 4 per cent., there seems to be still an untouched area of danger for the mother which it is the privilege, as it should be the responsibility, of the science and art of obstetrics to clear away.

At the meeting to which I allude, speaker after speaker corroborated the statements of the essayist as to the injuries inflicted upon the race by the neglect of scientific handling of this momentous period of women's physiologic life, but I was impressed by the fact that few seemed to appreciate the injustice of making this unfortunate situation an arraignment of practitioners of obstetrics, and it is in defense of that small but worthy group that I am moved to offer these remarks, as well as to point out the way to a remedy well within our reach.

I say the group of men at whose door the faults of obstetrics are thus unwarrantably laid is small, and I am myself astonished at the figures which show comparison between those who have undertaken the practice of this branch with sufficient exclusiveness to class themselves as obstetricians solely and practitioners of all other branches.

I have only approximate data to give you, as taken from the rostra of various special societies, though I do not know where one could look for better data. The proportion reads something like this (taking four representative cities of the East, namely, New York, Philadelphia, Boston and Chicago): In one society which registers 356 specialists in surgery, there are twelve who call themselves exclusively obstetricians; and in the same cities the American Medical Association, with 516 registered as surgeons, has twenty-four obstetricians.

When we take this percentage and set it over against the entire membership of the A. M. A., the figures

become nothing short of appalling, and the twenty-four obstetricians practically disappear from the reckoning when any attempt is made to fix the responsibility for the faulty obstetrics of the day. Obviously it is not they who are doing the work for our suffering communities, and I appeal again as I appealed in the discussion of Dr. Stein's paper for a reconsideration of this whole subject, and placing of the blame where it belongs and where the remedy should be applied.

Why then this neglect of a specialty, manifestly one of the most useful, broad and inclusive of the greater branches of medicine, as it is by all odds one of the most attractive and satisfying in its rewards? To answer this question we must look at the status of the art in public appreciation; for, after all, it is the attitude of the laity that determines largely the bent of the practitioner.

We shall insist, however, that the profession is not without influence in the matter of this public attitude, but, accepting the facts as they are, admit that there is no specialty about which there is so widespread a misconception as this.

Everybody is doing, has always done, obstetrics, and this continuity of common participation is one of the hardest things to break. In a short lifetime, with other, better defined, more recently organized specialties opening before him, the doctor hesitates to stake his future on a career in which associations are so indiscriminate and about which clings so much of old custom and superstition of ignorance. One dislikes to be disputing the ground with midwives or poaching upon the broad preserves of the general practitioner.

The situation is rather different with the other specialties. Most of them may be said to have grown out of the advancement of the science of medicine as research and study brought ever new knowledge of disease manifestations; as new names for old lesions seemed to give distinction to the branches making the

discoveries; to make them in a way creators of new science. But with obstetrics one is not concerned with finding a new disease.

It is not the elimination of a pathologic process which should be the preoccupation of a practitioner of this specialty, but the safeguarding and superintending of what should be the most normal of all life functions. Yet around this function gathers the history of all the worst forms of accumulated ignorance and malpractice, and still vitally connected with its practice is a discouraging mass of all the errors and misconceptions still extant.

The general public has its inherited ideas of childbirth, and while pursuing a sort of existence inimical to the normal fulfilment of the function, goes on stubbornly ignoring the mischief that has been wrought and neglecting the care and preparation which widespread pathology demands.

If the profession does not take the lead in changing the situation, the day is coming when this will be recognized by all constituted commissions of public health and by all authorities occupied with the socialization of reforms, as the most pressing concern of a people which wishes to save itself from extinction. But it has not been left to government authorities to suggest the great health movements which have brought us through former perils to where we are; it is the medical profession which has originated all such suggestions and the reward is with us in the acknowledgments of communities and states.

The moment for the inauguration of a new movement for better obstetrics is now. Not only must we insist upon it that general practitioners be better equipped for the emergencies which are met, too often without being recognized, in such a great percentage as our figures show, but we must launch a veritable campaign for such an understanding and appreciation of the importance of obstetrics as a specialty standing

alone, as shall make it not equal in attraction to any other, but to all the others together, since the scope of its application is universal.

When we speak of an insistence upon better practice on the part of those now doing the work we are demanding what it will be difficult for men in the press of modern activities to render. The blame is not alone on the lack of training and comprehension of this great specialty, it is on the attitude of mind that permits one to grasp at the performance of grouped specialties, any one of which is worthy one's entire time and attention.

When we consider the character of the pathology to which the pregnant and parturient woman is subjected, it is evident that unless the practitioner of obstetrics gives himself to it with enthusiasm and the best of his time, he is but skirting the edge of its possibilities.

There is hardly an aspect of medical science today that is not recognized as having its bearings on parturition, and more and more we are making discoveries that compel us to abandon the old easy methods of generalization and devote ourselves to the study, not of diseases in the mass but of individual cases, so large a part do the new, vague menaces of anaphylactic manifestations, metabolic variations and varied tolerances play in all therapeutics and in prophylaxis.

In handling our cases, we must remember that it is the losing or the saving of the individual that counts, and in this specialty we have two individuals in danger. And our concern is not only with the present but the future, for in every measure taken to ensure safe and healthy delivery of the child we are steadying the heartbeat of the age that follows us.

Gentlemen, it is for us to do our part in that movement which we are fond of calling *making the world safe for democracy.*

We have a vastly better opportunity than those who have the reforming of some broken product of faulty

birth. It rests with us to begin such a campaign of education as shall render the public afraid to undertake so serious a step as the bringing new life into the world without the advice and supervision, during the entire period of gestation, of the ablest obstetrician obtainable.

It is for obstetricians to remove from the way of the embryo those dangers which make its progress to birth the questionable thing statistics prove it to be. It is still more the duty and privilege of this specialty to oversee the condition of the mother from the first advent of maternal hopes until safe delivery of a healthy child, with satisfactory conclusion of the puerperium.

That this is not done by those at present intrusted with midwifery practice, the vast army of crippled, inefficient women doomed to defeat in life's struggle is sufficient witness. It does not need the actual figures of gynecic disease incident to childbirth to point out the great need of reform, though the records of any gynecologist are a sufficient proof of the lack of obstetrical training.

These familiar after effects do not, however, represent the relation of faulty obstetrics to the general morbidity among women; they are for the most part local manifestations, and leave a wide margin of speculation as to the part played in the etiology of many systemic diseases by pathology in childbirth.

This illuminating fact can only be established by a system of careful and organized keeping of comparative records. This brings us to a consideration of the main remedy for the evils we have only begun to estimate. First, of course, there must be insistence upon greater skill and judgment on the part of the accoucheur, who might, by the way, well drop that title in favor of one that shall express more truly the function of a practitioner who presides over the entire period of gestation and the puerperium as well as labor itself.

Such cognomens were invented when presiding at birth and the ten days following were the measure of obstetrical responsibility.

With this will come a propaganda for the education of a careless public in matters of such universal importance. There might well be a close cooperation between the work of obstetrical societies and that of the various organizations for child welfare and for public health. Statistics should be gathered from schools for backward and defective children, from asylums for the blind, from hospitals for the insane and the feeble-minded and the crippled.

But chiefly there should be kept at all hospitals complete records of all cases of childbirth, and obstetrical cases should no longer be permitted in any hospital not specially equipped with all that pertains to the most efficient practice of the obstetrical art. In this direction the recent movement for hospital standardization is destined to play an active part.

When the records of all cases are not only kept on file in every institution receiving patients for treatment, but are accessible at all times to the public for study and comparison, the day for which medicine has waited so long will have come.

Then the public will not risk life and health in the hands of those whose claim to popularity rests on the power of personal advertising, but will meet the profession in demanding that advisors and custodians of the public health shall have authoritative, documentary evidence of their ability to assume the grave responsibilities which attend upon human pathology.

And this evidence shall be furnished by those standardized medical colleges which are following, and leading, the movement for *practical* higher education; and by standardized hospitals whose case records are methodically and systematically kept to the last detail of therapeutic significance.

Hospital standardization will do more for obstetrics than any unorganized efforts could accomplish.

It will do away with false standards of merit; it will once for all clear the atmosphere of that lingering aroma of superstition which surrounds one who is supposed to be a "born doctor," and will establish the fact that it is trained skill which saves the patient. Hospital standardization will make it obligatory upon staff and institution to show that they can and will furnish the highest degree of efficiency in caring for the pregnant and puerperal woman and her offspring.

To recapitulate: The charge that poor obstetrics is to blame for a large per cent. of the evils and handicaps of childhood does not lie against the group of professed specialists in this science, but rather against the indiscriminate group of practitioners of all ilks, licensed and otherwise, who engage in the art as a side issue to other specialties. The uninformed public should be educated into a proper attitude toward this most important issue. All that the profession can do to raise the specialty in importance and estimation and to make it a factor in the betterment of the race and in the reduction of mother and child pathology should be done. Effective aids in this campaign are the new movements in behalf of new methods in medical education and the standardization of hospitals; with particular emphasis upon the keeping of all reords of obstetrical wards and hospitals and of private practice, to the end that by comparison and study and research into allied branches much of the reproach may be lifted from a science which still acknowledges so high a mortality in its proper field, and which has not yet taken any accurate method of estimating the vast morbidity among women and children directly traceable to error, mishandling and misconception of the natural function of childbirth.

1200 American Building.

ABSTRACT OF DISCUSSION

DR. EDWARD P. DAVIS. Philadelphia: There will be no special improvement in obstetric practice until the laity believes that the conduct of a difficult confinement is as

important as the treatment of a case of appendicitis or other serious intra-abdominal condition. There will be no special improvement in obstetric practice until the profession is willing to view difficult confinement in the same light; then, and then only, will something practical and valid be done. That will come about in several ways: First, from the economic side, whereby human life will be prized more highly. Second, by a broad social economic movement whereby the wage earner of small means will be given sufficient wage and sanitary conditions for livelihood encouraging early marriage. Third, we shall have a sound, vigorous, growing population become the backbone of the country—the man who works, not only with his brain, but with his hand as well. Fourth, there must come from the side of the state definite action regarding the welfare of the coming generation. Hospitals receiving state aid must provide suitable accommodations for maternity cases. Fifth, hospitals that do not give resident physicians maternity service must not be rated A-1. Sixth, all those institutions which have to do with the medical care and the nursing of the parturient woman must receive liberal support. Seventh, medical teachers have a very distinct duty in this regard. The medical student goes to the arena of the surgical clinic and witnesses operations and is duly impressed with their gravity. He must also be duly impressed with the gravity of obstetric operations, and medical teachers in my experience have a duty especially in two directions: (1) To insist on accurate obstetric diagnosis, and (2) on the gravity and importance of obstetric operations. It would be no bad wish to say to a graduating class of medical students: "Gentlemen, we hope, in the providence of God, that few of you will undertake major obstetric operations for a number of years, but we do hope that you know when the presenting part has engaged and when it has not, for that knowledge is essential." Furthermore, there will come improvement when the general practitioner who is doing a considerable practice is willing to admit that obstetrics is done by him against his will. He knows it now, but he dare not admit it for he does not wish to lose the medical practice of the family, and he knows if you get the wife the rest of the family follows, certainly the man, of course, the children; and, therefore, having attended the wife in confinement he is not going to resign his attendance in that family, and yet, general practitioners of large practice have frequently expressed the feeling that they would gladly give over their obstetric work to suitable hands, provided obstetrics was recognized as a specialty. What specialty is left for the general practitioner? There seems to be a sort of feeling that no physician has reached the full stature of medical life who is not in some way a specialist. And yet, one has said that a specialist is a localized hypertrophy! Now, what is there for the general

practitioner? The best specialty of all, the specialty of general diagnosis, accurate observation and wise counsel. The fortune of the patient is in the hands of the woman or man who first sees that patient, and then comes the specialty of the general practitioner. And I cannot conceive of any more noble and gratifying career in medicine than to be recognized as a safe, intelligent, wise diagnostician in a town and in a region surrounding that town, for such a man is the groundwork of the health of our people and the groundwork of the dignity and the honor of our profession. I believe the time is ripe for improved obstetrics along the lines so well expressed by Dr. Newman. And I am sure that the intelligence of the American people will not fail to grasp the significance of the present movement and adequately to meet it, and I give tribute of appreciation and admiration to the general practitioners who have met the complications of obstetrical practice single handed in the years past and who have fought and won against death in emergencies in which we who are specialists must have a hospital and trained assistants. I withhold nothing from them in admiration and appreciation, but it was a thoroughly unjust thing for them, a thing which they should not have been called on to do, and so today the evolution of the modern hospital, the improvement in the roads, all these things are bringing about the day when the woman whose confinement will be complicated, when all primiparous women will go to the hospital for confinement and when there will be on the staff of every hospital competent obstetricians.

DR. E. GUSTAV ZINKE, Cincinnati: Had I the means, I would erect a monument to every man and woman who undertakes the practice of obstetrics understandingly, knowing every phase of it, and devoting his or her time and talent to the pregnant who place themselves in their care. The question of obstetrics as a specialty is a serious one. Notwithstanding the fact that today obstetrics is taught in the United States as it has never been taught before, men and women who have but a superficial knowledge of obstetric diagnosis and of the mechanism of labor in its various forms are still accepting the care of obstetric cases. And this is the reason why women, placing themselves in the care of so-called ignorant midwives, show a smaller mortality and morbidity than those attended by physicians. Why is it that we have so few obstetricians who confine themselves exclusively to the practice of obstetrics? Because it requires a great deal of knowledge, judgment, wisdom, and care to look after the pregnant properly and to conduct labor and confinement. Another reason is that there is so little remuneration in these cases. One who confines himself to obstetrics alone can scarcely eke out an existence. He may be able to do so in New York, Philadelphia and Chicago, and perhaps

in a few other places, but I know it is impossible to do so in Cincinnati, and almost all other cities in this country.

DR. JOHN F. MORAN, Washington, D. C.: The thought of the improvement of obstetrics has been in my mind for some years. I have given it much study and can voice with sympathy and emphasis what has been said. Too little attention on the part of the layman and on the part of the general practitioner has been given the matter. It is unfortunately true that many of the general practitioners are simply male midwives. They are dangerous, as has been stated indirectly, because they have anesthetics and instruments at hand, whereas the female midwife sits patiently and waits for Nature to do her work. The time has come, it has been well said, when this branch of medicine needs particular study. It requires more thought and more judgment than any other department of medicine. When I have said this I think I have said that which is most essential to obstetric work, and this can only be brought about by greater emphasis in the school curriculum. There is too much time spent by the student in the surgical amphitheatre. Much better would it be were that time devoted to training in obstetrics. I hope with the essayist and the gentlemen who have discussed the paper that in the future more time shall be given than in the past in the college curriculum to the study of obstetrics.

DR. ARTHUR STEIN, New York: At the joint session of this section and the Section on Nervous and Mental Diseases in 1917 I discussed this question and I was prompted to take up the study of the subject by my observations as an obstetrician. Very frequently I saw children born after very difficult forceps applications with deep indentations of the bones of the head, with hemorrhages in the eyes, etc., and I wondered what became of those children. The obstetricians are through with the children after two, three or four weeks, but we do not know what becomes of them after five, six or eight years. I looked up the histories of many hundred cases in obstetric clinics without any result. I then went to the Hospital and Training School for Mentally Defective Children at Randall's Island, New York City, and studied approximately 1,800 cases and found that a great majority of these children were born under great difficulty. To my mind if there could be a closer cooperation between the institutions for defective children and the large obstetrical clinics much could be accomplished by the prevention of mental deficiency in children.

THE NEWER METHODS OF CESAREAN SECTION

REPORT OF FORTY CASES

JOSEPH B. DE LEE, M.D.
CHICAGO

The classic cesarean section has come to be one of the safest laparotomies, and at the same time one widely practiced. There is no question that it is too widely practiced, the trust in its general safety being great. This idea in regard to its general safety is the result of the publication by obstetric specialists of series of from fifty to 100 cases without mortality. I myself have had more than 100 successive classic cesarean sections without maternal death ascribable to the operation. Even the people have become imbued with the notion that cesarean section is entirely safe. Indeed, one woman was sent to me by a physician who told her the abdominal delivery was *the* method of childbirth of the future.

MORTALITY FROM CESAREAN SECTION

Accoucheurs of experience know that cesarean section is not so safe. They know that their good results are due to the careful selection of the patients submitted to the operation. They have observed numerous fatalities when proper strictness was not observed in deciding on the abdominal delivery. F. S. Newell said he knows that in several towns around Boston, the mortality (unpublished) from cesarean section has been frightful. He reports eight deaths in 100 cases at the Boston Lying-In Hospital up to 1909. Amand Routh, in 1910, found a general mortality for England

of from 2.2 to 34 per cent., depending on the condition of the mother at the time of the operation. Cragin had 143 clean nontoxic cases with three deaths. Williams believes the general mortality will be 10 per cent., and only in the most ideal surroundings and, at the beginning of labor, will it be from 1 to 2 per cent.

In Chicago, deaths due to cesarean section not infrequently occur but are not put on record, and recently the newspapers of a certain county of the state published a successful cesarean section as a wonderful achievement, the woman being the first to survive the operation in the county.

MORTALITY IN CESAREAN SECTIONS

	Extraperitoneal			Transperitoneal			
Name	No. of Operations	Deaths Mother	Deaths Baby	No. of Operations	Deaths Mother	Deaths Baby	Remarks
Hirst	6	1	1	27	0	0	
Brodhead	1	0	0	4	0	0	
Davis	8	1	1	..	..	..	All infected cases
McPherson	10	2	2	..	..	..	All infected cases
McNeile	..	..	..	2	0	0	Both infected
Ritchie	..	..	..	1	0	0	
Chalfant	..	..	..	2	0	0	
Williams, J. W.	4	0	0	..	..	..	
Polak and Beck	..	..	..	34	1	0	All suspicious
Kohlman	8	0	0	3	0	0	5 suspicious
De Lee, Stowe and Cornell.	2	0	0	44	0	0	10 suspicious
	39	4	4	117	1	0	

There is an unavoidable mortality to cesarean section. It increases: First, with the length of labor; one might say about 1 per cent. every two hours; second, with the number of vaginal examinations made, or operations attempted; third, with the rupture of the membranes; fourth, with the lack of skill of the operator. Furthermore, there are certain women who carry infection in the vagina—harmless there, but fatal if brought on to the peritoneum. There is no way of discovering it beforehand. Leopold of Dresden found gonorrhea in some of these cases.

MORBIDITY OF THE CLASSIC CESAREAN SECTION

In addition to the mortality, the classic cesarean section has a distinct morbidity. Just as the mortality has been gradually reduced by proper selection of the cases, by operating early, by refinement of operating-room technic, etc., so has the morbidity been reduced—but not in like proportion. A large proportion suffer from peritoneal shock. In fully 20 per cent. of the cases there is fever after operation. Uterine abscess occasionally follows, partial paralytic ileus and gastric dilatation not seldom occur, adhesions of omentum or intestine to the uterine or abdominal scar are the rule, and the danger of rupture of the uterine line of suture in subsequent labor is still a real one. The five main objections to the classic cesarean section are: the inherent mortality, the frequency of abdominal complications, adhesions, rupture of the scar in subsequent labor, and the necessity to restrict the operation to clean cases.

In infected, or possibly infected cases of obstructed labor, since pubiotomy is too dangerous, craniotomy is the only alternative; and it is to reduce the necessity of this horrible operation that the newer methods of cesarean section have been developed.

Since the objections enumerated always beset the classic cesarean section, and since the greatest dangers came from the fact that the peritoneum was opened, the old accoucheurs sought to avoid this necessity and tried to extract the child from beneath the peritoneum. The first suggestion came from Joerg in 1809, and Ritgen performed the operation in 1821. Physick of Philadelphia, in 1824, recommended this method to Dewees of Philadelphia, but I could not find that Dewees had performed it. Joerg had suggested that the incision be made in the flank, and that the peritoneum be dissected upward, in the manner preparatory to ligation of the internal iliac artery, the child then being extracted from the parturient canal. In

1870, T. Gaillard Thomas revived the operation which had been named "gastro-elytrotomy" by Baudelocque. Very few of these cases were successful, as we can readily understand. It was because of the lack of asepsis, and infection killed nearly all of the women.

ATTEMPTS TO IMPROVE THE CLASSIC CESAREAN SECTION

Attempts to improve the classic cesarean section, to make it adaptable to the neglected cases, failed until 1906, in which year Frank, of Bonn, disinterred the old extraperitoneal methods. He opened the abdomen just above the pubis, united the peritoneum of the uterus to the peritoneum of the abdominal wall, thus shutting off the general peritoneal cavity, and delivered the child through the almond-shaped space provided. Later Sellheim attempted to push the peritoneum upward from off the bladder, as was recommended by Physick in 1824, which thus freed the space over the cervix and lower uterine segment, through which he delivered the child.

Many operators, mostly continental, developed these ideas, and now there are about twenty different procedures.[1] All these methods of performing the operation depend on certain changes which occur during pregnancy and labor in the relations of the cervix and lower segment to the bladder and vesical peritoneum.

We know that during pregnancy the peritoneum over the lower uterine segment and bladder becomes very much softened and loosened from its base. It also hypertrophies under the stimulation of pregnancy. With the development of the lower uterine segment and cervix in the latter weeks of pregnancy and particularly in labor, the muscle of the cervix is drawn away, upward and outward, from the bladder attachments. The vesico-uterine culdesac is usually obliterated. The peritoneum is also drawn upward at the

1. For literature compare Nicholson: Surg., Gynec. & Obst., Feb., 1914, p. 245, and Küstner: Zentralbl. f. Gynäk., No. 31, 1915.

sides of the bladder in the neighborhood of the round ligaments. At the same time the mobility of the peritoneum on the subjacent structures becomes much increased. It is therefore possible, after incising this portion of the peritoneum, to push the bladder off of its cervical attachments with great ease, and to expose an area of the cervix and lower uterine segment large enough for the delivery of the child without encroaching on that portion of the peritoneum which is opened in the classic cesarean section. Of the twenty or more operations that have been invented, only two seem likely to obtain recognition.

THE TRANSPERITONEAL VERSUS THE EXTRAPERITONEAL METHOD

All these methods may be divided into two classes: first the transperitoneal, or perperitoneal, and second, the extraperitoneal. In the transperitoneal operation, the abdomen is opened above the pubis, and the peritoneum over the cervix, near the bladder, is incised and loosened from its bed. By means of closely set continuous sutures, or by clamps, the parietal and visceral peritoneal layers are united. Some operators omit this part and protect the general peritoneal cavity by packing sponges around the uterus. In clean cases no more is necessary. The lower uterine segment and cervix are then incised, the child delivered, the placenta following; then the uterus is closed and the double layer of the peritoneum also reunited. The general peritoneal cavity thus is temporarily removed from the field of operation, and infectious matters, such as meconium, liquor amnii and blood, are not permitted to spread over it. Some operators cut the line of temporary peritoneal sutures, and reunite the individual layers of peritoneum. Others do not do this, but sew the two layers together. Sellheim sews the uterine wall to the skin and leaves the wound open to drain, and calls such a delivery one

through a utero-abdominal fistula. Among the transperitoneal cesarean sections, that invented by Krönig and modified by Gellhorn of St. Louis seems to possess most advantages, and is used in suspected cases.

Of the extraperitoneal methods, that of Latzko is the best. In Latzko's operation the incision is made either transversely or longitudinally, just above the pubis. The peritoneum is pulled out of the pelvis, the bladder is pushed off of the cervix to the right; and beneath the vesico-uterine fold which has been pushed up toward the navel, a bare space of cervix and lower uterine segment is provided, through which the child is delivered.

THE INDICATIONS

From the description given above it is evident that two new operations have been added to our armamentarium. Both have this in common—the lower or cervical zone of the uterus is opened for the delivery of the child, whereas, in the old, the classic operation, the corpus or fundus uteri is opened. We must hereafter speak, therefore, of cervical cesarean section, and corporeal, or classic, cesarean section. Since there are two methods of cervical section, and each one has its own indications and conditions, we have three distinct operations to consider when the question of abdominal delivery arises. It is not alone, "Shall we perform cesarean section in this case?" but, "Given the indication for abdominal delivery, what kind of section shall we perform?"

ABSOLUTE AND RELATIVE INDICATIONS FOR CESAREAN SECTION

The old teachers divided the indications for cesarean section into absolute and relative: The absolute indication existed when there was no possibility of delivering the child through the natural passages, the way being blocked by a contracted pelvis, a neoplasm, scar tissue, etc.; or the child being a mammoth. The

relative indication existed, when, after carefully balancing all conditions, the accoucheur decided that the abdominal delivery offered the best chances for mother and child. It is therefore almost wholly subjective, and it left a wide field for the play of individual preference, for the influence of isolated experience, and for the clash of contending statistics. Moderately contracted pelvis, placenta praevia and eclampsia are the main so-called relative indications. Before taking up the specific indications, let us study the comparative merits of the two contenders for favor, the corporeal and the cervical cesarean sections.

The objections to the classic cesarean section have been mentioned.

1. *The Mortality.*—I believe no one of experience will contest the statement that 2 per cent. of patients undergoing a clean nontoxic cesarean section die at present. Does the cervical cesarean section reduce this mortality? In reply to a questionnaire ten operators report 117 cases of transperitoneal and thirty-nine cases of extraperitoneal cesarean section, with the death of five mothers and four babies. Hirst, Brodhead, A. B. Davis, McPherson, McNeile, Ritchie, Chalfant, J. W. Williams, Polak and Beck, De Lee, Stowe and Cornell did these operations, and it should be noted that most of these women were either frankly infected, or suspected, at least unsuitable for the classic section. Reusch[2] completed a list of 595 operations which have been performed in Europe, with a mortality of less than 2 per cent., and, again, these were largely on patients who were already infected.

My assistants and I have operated in forty-six cases without fetal or maternal mortality. Theoretically and practically there are many reasons why this should be so. The incision is made in the lower part of the uterus, the cervix, well known to resist infection.

2. Reusch: Zentrabl. f. Gynäk., No. 40, 1917.

The same may be said of the lower abdomen; it resists infection better than the upper; hence, the Fowler position. The uterine wound is at rest, lochia is not squeezed through it by the after-pains, and furthermore, should a leak in the cervical line of suture occur, the leakage is under the peritoneum, between the bladder and the cervix, where it could be easily reached in three ways: by the cervix; between the cervix and the bladder—a simple anterior colpotomy—or by opening the lower corner of the abdominal wound. Should infection wander along the line of suture (as it often does) in the corporeal section, it at once reaches the peritoneal cavity; in the cervical section it reaches a safer area—one more easily drained.

Another element of safety is the entire absence of any handling of the intestine. Often the intestine does not even come into view. Liquor amnii, vernix caseosa, meconium do not soil the peritoneum.

2. *Abdominal Complications.*—Comparative statistics on this point I have been unable to obtain; but the opinions of careful observers are worth something. The convalescence after the cervical cesarean section is, without question, smoother than after the classic section. Peritoneal shock, ileus, gastric dilatation, I have not yet observed—for reasons above mentioned; tympany and postoperative pain are decidedly less, and one gets the impression that the woman has suffered only a minor operation, not the ordeal of the old cesarean section. This feeling of well being after the cervical operation is really remarkable. The puerpera is more comfortable than a patient after an interval appendectomy, the convalescence resembling that after normal labor. These observations are confirmed by the interns and nurses who can compare the two kinds of operations. Of my own thirty-one cases, there was suppuration in only one case, which is the more noteworthy since in nine of them there was a slight suspicion of infection.

3. *Adhesions.*—Regarding peritoneal adhesions, I cannot speak finally, having operated on only two patients for the second time. There were none in the one case, and in the other there was suppuration, so we expected them. Titus reports three cases (reoperations) without adhesions. Continental accoucheurs report them absent, and theoretically they should be. In most of my operations the intestine was not touched, and in many of them it did not come into view at all. Furthermore, the contents of the uterus, which many times are irritating if not actually infectious, do not soil the general peritoneal cavity, and finally the line of uterine suture of the finished operation is only about 2½ inches long, smooth and without catgut knots, and when the bladder fills, is covered by this viscus. In the true extraperitoneal method (Latzko) the peritoneal cavity is not opened at all, and in the absence of infection, adhesions, ileus, etc., will not occur. Adhesions are sometimes caused by seepage of lochia. This is impossible with the newer methods.

4. *Rupture of the Uterus in Subsequent Labor.*—I found only two cases of this on record, and, in both of these, part of the incision had been made in the body of the uterus. In my two cases of pregnancy after the cervical operation, the scar was not visible at the second cesarean. Continental writers claim this immunity from rupture as a specially strong point in favor of the low cervical method. Experience with vaginal cesarean section in which the incision is made in the same part of the uterus is confirmatory. The freedom from danger of subsequent rupture is easily understood. When the cut is made in the body of the uterus, the wound surfaces are not at rest during the healing process. With each after-pain, the sides of the wound grind on each other, and even in the absence of infection, are prone not to unite. When the cut is made in the cervix, all this is absent. The wound is at perfect rest.

5. *Expansion of the Field for Abdominal Delivery.*—Without doubt, the cervical cesarean section will in many cases obviate the necessity of craniotomy, and its greater safety will allow us to perform the abdominal delivery under circumstances in which previously we may have desisted: for example, in eclampsia, breech presentation, or prolapse of the cord. Best of all, we may give the parturient a thorough test of labor, lasting hours if need be, which is most unwise with the classic operation.

SPECIAL INDICATIONS FOR THE CLASSIC CESAREAN SECTION

In general, I must say that the more I do these newer operations, the better I like them, and now they are the first thought when the question of cesarean section arises. For doing the old, or classic, cesarean section, I have to have special indications, and these are, usually, the necessity for instant delivery, the desire to remove fibroids, placenta praevia, when a Porro operation is to follow, and in the case of an extremely pendulous abdomen. Experience may prove it possible to omit some of these exceptions.

The choice between extraperitoneal and transperitoneal methods is still undecided, but the majority of operators prefer the latter. The true extraperitoneal operation has the distinct advantage that it protects best against peritonitis—infection, if it occurs, being less dangerous in the connective tissue, and drainage being easily procured. Its disadvantages are that it is often hard to separate the peritoneum and the bladder from the uterus, the peritoneum often and the bladder occasionally tearing through. The uterine incision sometimes extends down into the base of the broad ligament where lie the large veins and ureter; also the delivery of the child is technically more difficult and its mortality slightly higher. For these reasons, and further, since the results for the mother are almost as good, the transperitoneal operation is most often selected.

Let us now consider briefly the most common indications for abdominal delivery. In the presence of insuperable mechanical disproportion, that is, the absolute indication for cesarean section, the older obstetricians could only do, if discovered in time, a therapeutic abortion, or the classic cesarean section at term. If the dystocia was experienced only after infection was present or suspected, a Porro or complete uterine extirpation was demanded, if the life of the woman was not to be forfeited.

Nowadays we may proceed differently. Therapeutic abortion is absolutely contraindicated. At full term we have four courses to select from: the classic cesarean section, the classic cesarean section with the Porro modification, the transperitoneal cervical section, and the extraperitoneal section. In clean and in suspected cases I recommend the transperitoneal cervical section, and in frankly infected cases, the extraperitoneal section or the Porro cesarean section.

Of the indications comprised in the term "relative," nearly every obstetric complication we know has been advanced as a good reason for abdominal delivery.

In the treatment of labor in pelves that are not absolutely contracted, my plan has become more simplified in recent years. Unless the patient positively demands the induction of premature labor, I do not do it, but I allow the pregnancy to go to term. Just before labor begins I make a careful rectal and abdominal examination to determine whether or not there is any chance that the fetus will pass through the pelvis. If I decide it is highly improbable, I do the transperitoneal cesarean section as soon as labor is well under way. If there is reason to believe that the head will go through, I give the patient a real test of labor. If delivery is impossible, in primiparas, I do the transperitoneal section, in multiparas either this or pubiotomy, being guided by the individual conditions present. This statement holds also for cases in which infection is

suspected. In frankly infected cases I still fear to perform an abdominal delivery, in spite of the wonderful results recorded by continental operators. If such is necessary I would recommend the extraperitoneal method with free drainage in young women, and uterine extirpation in old. Williams recommends the Porro operation to meet this emergency. It is just in these neglected cases that the extraperitoneal method is the easiest of performance. The prolonged action of the pains has drawn the lower uterine segment out, pulling the uterovesical fold of the peritoneum high up away from the bladder, thus giving a large area for incision and the extraction of the child. However, in frankly infected cases, craniotomy is still to be held in reserve, since the child is almost always doomed anyway. Küstner is the only authority to contend that the operation will completely eliminate the necessity for craniotomy.

Eclampsia.—I will not discuss the question as to whether or not cesarean section has a place in the treatment of eclampsia. I am not yet ready to go back to the expectant and medicinal treatment of my student days, nor do I treat every case by instant delivery. If one desires a rapid, easy method of emptying the uterus, and one unattended by shock, the transperitoneal cesarean section may be selected. It may be performed under local anesthesia, just the delivery of the child being assisted by a little gas-oxygen anesthesia.

Placenta Praevia.—If cesarean section is done for this condition, I prefer the classic operation. In abruptio placentae, the transperitoneal is the method of choice, unless great speed of delivery is required to save the child. For neglected shoulder and breech presentations, prolapse of the cord, and in the innumerable other obstetric complications, the new operation will, I am sure, find a restricted field of usefulness.

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ABSTRACT OF DISCUSSION

DR. J. W. MARKOE, New York: Never have we had a better paper or one more called for than this one on cesarean section. The curse of the classical cesarean section is that it is too easy to perform and too dangerous because you open the peritoneal cavity and then the uterus, and no one knows what the uterus contains. The condition may be septic or it may not. Dr. De Lee's method is applicable in all cases in which we previously did the classical operation. I have never done the extraperitoneal operation except in cases which were known to be septic; the possibility of this operation taking the place almost entirely of the old classical operation is very great. It has difficulties. Pulling the bladder to one side is much more difficult in some cases than in others, especially if the head is very large. The patients I have operated on by the method described by Dr. De Lee have come to me with histories of having been in labor for from twenty-four to forty-eight hours, and who have a pelvis in which there was no possibility of the head coming through. Forceps had been applied or version tried and cultures showed the presence of the streptococcus, staphylococcus or colon bacillus. Notwithstanding this, however, not one of those patients died. In some cases the wounds broke down. I used Carrel's tubes, very imperfectly in the first few cases, but in the later cases, where he showed me the technic, the wounds healed extremely rapidly. There was no complication whatever, and only this winter I delivered one of those women again by cesarean section. When I removed the child I put one hand into the uterus and the other in front on the bladder. There was absolutely no sign of adhesions. Had I known that such would be the case I would certainly have done a transperitoneal operation, such as Dr. De Lee describes, at the lower zone. That, I think, is the coming operation for we never know whether these patients are septic or not. I have done only five transperitoneal operations. One woman had a streptococcus infection and died within forty-eight hours of general peritonitis. I consider that Dr. De Lee has done the profession the greatest service in bringing out this cervical operation.

DR. JOHN OSBORN POLAK, Brooklyn: I am in accord with practically everything Dr. De Lee said in regard to the advantages of the transperitoneal operation. I have had no experience since my student days with the extraperitoneal operation, when I had the privilege of assisting my predecessor, the late Dr. A. J. C. Skene, in doing one laparoelytrotomy, as it was termed by Thomas. I have been doing the transperitoneal operation since 1912. I have employed two technics, the Veit-Fromme, as modified by Hirst, in fourteen or fifteen cases. All of the women recovered, but a large number of wound suppurations occurred. During the

last few years I have been doing the Krönig operation, until recently when at a necropsy on a woman operated on by one of my staff we found what actually happens if the infection spreads from the interior of the uterus—the same finding has been confirmed in necropsies on cases in which the classical operation has been done. We have studied the pathology in seven necropsies during the last twenty years on women dying after the classical operation, and all have shown that the infection is not from the spill of amniotic fluid but from the extension of infection from the uterus through the suture hole. The history bears out the necropsy findings. The peritonitis develops five or six days after the operation and the patient dies promptly as the result of an ascending peritonitis. In using the Krönig technic we could not always cover the uterine incision with the peritoneal flap. If this incision is made too high up in the uterus and is not covered with peritoneum the leak may come through. The lantern slide shows a picture in which the bladder flap was thrown over the wound, but the tip of the bladder peritoneum has sloughed and allowed leakage through the suture holes which caused a plastic peritonitis, which has resulted in an ileus, the adhesion of the intestine has confirmed the peritonitic extension and the upper part of the abdomen is absolutely free from infection. The Krönig procedure is best done late in labor as the bladder is carried up at the lower segment thins out. The bladder can then be separated readily by blunt dissection or by scissors as they pass down under the peritoneal attachment. A suggestion made by my associate, Dr. Beck, was to make an upper flap of the upper part of the peritoneal fold with the upper and lower flaps retracted by retractors, then the cervical segment of the uterus is incised and the child's head delivered by any of the methods indicated. One point in the technic is important, i. e., to put in the upper and lower sutures, leaving the ends long and using them as tractors before the rest of the sutures are placed in order to bring the uterine wound into the field of operation and make suturing easier. After this is done the upper peritoneal flap is brought down over the line of incision and tacked by one or two sutures placed lateral to the median line and the bladder carried up and sutured to the anterior face of the uterus. The result is a complete peritonealization; the wound in cervical segment is completely covered by peritoneum. In the convalescence of these patients there is no gas distention, no elevation of temperature. We feel that in this operation we are subjecting the patient to but a slight risk and that if there is infection, which is usually due to extension through the lymphatics, we have a parametritis and not a peritonitis. If suppuration occurs drainage of the abscess may be made without entering the peritoneal cavity.

DR. E. GUSTAV ZINKE, Cincinnati: During the last month I have performed two cesarean sections which illustrate the ease, as well as the danger, of the operation. I am speaking now of the corporeal operation as described by Dr. De Lee. The first operation was performed in a perfectly clean case, secundipara. It was a case of placenta praevia centralis, with profuse and uncontrollable hemorrhage. The operation was completed in thirty minutes. The patient recovered without the slightest untoward symptom, and went home at the end of two weeks with a healthy baby. The second patient was the victim of a so-called justo-minor pelvis. She had passed through a very severe labor several years before, the child being lost because of the unsuccessful use of the forceps, followed by version. Considerable injury was done to the soft parts of the mother. I gave her the test of labor. A small child in a favorable position, I thought, might pass; but the passenger proved to be larger than the passage, and I concluded to perform cesarean section. The operation was accomplished without difficulty. There were no complications; but I do not remember a case that gave me so much anxiety within the first five days following the operation. Vomiting began soon after the operation. The patient's husband, a doctor, attributed it to the calomel she had received the day before the operation, saying that it always made her sick for a week. The vomiting continued, yet there was no alarming distention of the abdomen. While I listened to what the husband had to say, I could never fully make up my mind that the calomel was solely responsible for the continuous vomiting. After seventy-two hours I became suspicious that, probably, we had a beginning ileus. Her husband insisted that the calomel alone was the cause. On the evening of the fourth day a consultation was held. On the morning of the fifth day there was stercoraceous vomiting, and the picture was clear. The abdomen was reopened, and a knuckle of small bowel was found adherent to the uterine wound. This was quickly loosened, and the abdomen again closed. The patient returned to her home three weeks after the cesarean section. Ileus is one of the dangers in this operation.

One point which impressed me in Dr. De Lee's paper is that "cervical" cesearean section, the old operation, is looked on with favor in cases in which sepsis has developed. There is one mistake which practitioners are apt to make when they speak of septic infection in puerperal cases, and I have frequently called attention to this. We have two forms of puerperal infection, sapremic and streptococcic. Streptococcic, or true septic infection, is almost always fatal, no matter what measures are taken. In the sapremic variety the patients usually recover, if they are treated properly, sometimes even with a cesearean section. The peritoneum is the greatest friend the surgeon has. In abdominal opera-

tions, when we encounter pus, the trouble that follows is not so much in the peritoneal cavity, but rather outside of it, especially in the abdominal wound.

DR. BERTHA VAN HOOSEN, Chicago: The principal advantage of his operation is the fact that it is so much more difficult than the classical operation that it will not be attempted too readily by the man who does only occasional surgery. Another advantage is that the placenta will not give the annoyance that it often does in the classical operation. We must, however, use the classical operation and I have made a little attempt to copy some of the advantages of this cervical operation in the technic for the corporeal operation. Opening the abdomen in the usual way the body of the uterus completely fills and actually plugs up the incision. One of the things I have often noticed is that the operator uses great haste, and especially those who are inexperienced seem to think there is great haste in opening the uterus. But you may cut the peritoneum and the muscularis with great deliberation. The incision is first through the peritoneum, which retracts. There is practically no bleeding. With another incision the muscularis contracts and the uterus is delivered. Another incision is made rather deeply. Just as you approach the endometrium in some one place the blood will spurt up. At this place push in the finger and separate the mucosa from the membranes and with the knife on your finger open up the uterus. Now that the uterus is opened and the membranes are normally ruptured you can see the form of the child through the membranes and the bleeding has again on account of the tension stopped. For a few moments it is better to use a little haste. You can quickly incise the membrane and just as you do this your assistant puts her finger in the upper angle of the uterus and hooks it over so as to clamp the uterus to the abdominal wall so that the intestines will have no opportunity to be seen and the liquor amnii will have no opportunity to escape into the abdominal cavity. With the hand still clinging to the abdominal wall and hooking the uterus the placenta is removed and the suturing is now begun. Following the suggestion of Dr. Polak the first insertion is through the lower part of the muscularis which is followed by a suture through the top of the incision. The finger is removed and the two sutures are used to bring the uterus closely up to the abdominal wall. You can suture as you wish. As soon as the uterus is closed this lower suture by which the uterus was suspended is cut away, but the upper one is left in place until the peritoneum is closed down to the umbilicus or at a point where there is no tension on the uterus, and when there is no more tension it is cut. The uterus, now contracted, fills the abdominal incision and the peritoneum and abdominal wall can be closed

in the usual way. The chief advantage of the method is that little blood is lost and that you have absolute control of the abdominal contents.

DR. JOSEPH B. DE LEE, Chicago: The first impression a man gets of this operation is usually bad. Do not stop at the first operation but do three or four. In the presence of a virulent streptococcic infection I doubt whether any form of section is safe. Therefore, craniotomy would not be safe. A Porro operation or extirpation of the uterus might possibly increase the patient's chances. There is a big difference between the ordinary forms of infection which may under unfavorable conditions become dangerous and these rarer cases of fatal streptococcic infection. Dr. Van Hoosen pulls up the uterus against the abdominal wall to prevent the intestine getting in the way. This is not original. A corporeal cesarean section is a corporeal cesarean section, no matter how you do it. Dr. Zinke mentioned that he got his patient back into bed in thirty minutes. I know a man who did a cesarean section in eighteen minutes. Whether we take eight, ten or twelve minutes longer to do a complete operation makes little difference so far as the patient is concerned but it does make a difference if the operation is too hurried. You put in fewer stitches and tie knots carelessly, more damage is done to the tissues and one does not make as good uterine sutures. This is one of the causes of rupture of the uterus in subsequent labor. I put in four layers of sutures in the uterine wall and sometimes five.

THE USE OF BENZYL BENZOATE IN DYSMENORRHEA

JENNINGS C. LITZENBERG, B.S., M.D.
MINNEAPOLIS

It requires no little temerity to favor the addition of another drug to the already too lengthy list of medicines used for the relief of dysmenorrhea, but the logic of Macht's paper[1] recommending the use of benzyl benzoate in all painful spasmodic conditions of smooth muscle organs was too compelling to be resisted. Therefore, when my attention was called to this article by my colleague, Professor Hirschfelder, we determined to make a clinical study of this new antispasmodic, or rather this newly discovered action of a well known substance. This study is not based on the general run of cases as they come in private and dispensary practice, but on cases deliberately selected from among college women and nurses, because of their high intelligence and ability to cooperate in following directions and answering necessary questions under circumstances known to be experimental.

This so-called minor gynecologic condition has great import because of its frequent ocurrence, its economic influence, its unknown etiology and the very unsatisfactory results of its treatment. Tabler and Engelman (Block)[2] say that from 50 to 80 per cent. of American girls suffer from dysmenorrhea. Be the percentages what they may, there is scarcely a school, store, office, factory or home that is not interfered with on account of young women being either reduced in efficiency or entirely incapacitated.

1. Macht, D.: J. Pharmacol. & Exper. Therap. **11**: 419 (July) 1918.
2. Tabler and Engelman (Block), quoted by Doederlein, T. J.: Surg., Gynec. & Obst. **19**: 165-168, 1914.

CLASSIFICATION OF DYSMENORRHEA

Of the etiology of dysmenorrhea we know little, and none of the many theories has been incontrovertibly established; although the following classification of Block,[3] based on theories of cause, comes nearer being really logical than most others:

1. Obstructive. These cases are usually operative.
2. Ovarian, due to an increase of ovarian secretion; treated by inhibiting the hyperactivity of the ovary by cocainizing or cauterizing the "genital spots" on the nasal septum or by neutralizing the excessive secretion with epinephrin.
3. Vagotonic, due to irritability or increased tonus of the autonomic nervous system. This type is usually called spasmodic, or essential dysmenorrhea; treated by an antispasmodic like atropin which diminishes the irritability of the autonomic nerves, thereby relaxing the uterine musculature, thus relieving the colic.

The pelvic division of the autonomic system supplies the uterus, and there are also fibers from the antagonistic sympathetic system.

In women with vagotonia, which is an increased irritability of the autonomic system, the uterus is spastic; the control by the sympathetics having been in some way overbalanced so that at the menstrual period spasmodic or essential dysmenorrhea results.

VALUE AND EFFECT OF ATROPIN CONTRASTED WITH THAT OF BENZYL BENZOATE

As atropin paralyzes the autonomic group, it is a logical treatment for this type of painful menstruation.

Novak of Baltimore[4] called attention to the atropin treatment and reported good results in about thirty cases and he quoted Novak of Vienna,[5] who had used it for many years.

3. Block: Am. J. Obst. **72**: 945 (Dec.) 1915.
4. Novak, Emil: The Atropin Treatment of Dysmenorrhea, J. A. M. A. **64**: 120 (Jan. 9) 1915.
5. Novak, J.: Wien. klin. Wchnschr. **26**: 671, 1913.

For some time I have used atropin in doses of from $\frac{1}{150}$ grain to $\frac{1}{50}$ grain, according to the severity of the attack, with very satisfactory results; but I must confess to a reluctance to use it extensively because it is too potent a drug to place in the hands of every patient fourteen times a year and, furthermore, it frequently must be given in dysmenorrhea to the point of tolerance in order to get the desired antispasmodic effect.

The favorable reports on the use of atropin, the logical basis for its use and the good results obtained convinced me that an antispasmodic was certainly indicated in essential or spasmodic dysmenorrhea, which conclusions prepared me for a ready acceptance, for trial at least, of the benzyl esters as antispasmodics in place of atropin.

Macht showed by animal experiments and clinical trial that benzyl benzoate had the same antispasmodic action on smooth muscle organs as certain opium alkaloids of the papaverin type, this action being due to the benzyl component of the molecule in these substances; benzyl benzoate, however, having the advantage of being practically nontoxic.

Atropin produces its antispasmodic effect by paralyzing the autonomic nerves supplying unstriped muscle, but the benzyl esters seem to *act only on the muscle cell itself*.

Macht tried benzyl benzoate with beneficial results in gastro-intestinal colic, renal and ureteral spasm, biliary colic, dysmenorrhea, angiopastic conditions and bronchial spasm. He reports 300 cases, in some of which benzyl benzoate was continued over long periods with no dangerous or toxic symptoms.

SIZE OF BENZOATE DOSE

Macht used a 20 per cent. alcoholic solution of the drug flavored with some carminative, giving a dose of from 10 to 30 drops in cold water.

Our first patients complained bitterly of the unpleasantness of this solution, especially the aftertaste, so Professor Hirschfelder made up a 20 per cent. emulsion with acacia in aromatic elixir of eriodictyon which proved a much more pleasant medicine to take.

In dysmenorrhea we did not get quite as complete relief as desired with the dosage recommended by Macht, so we increased the dose to 1 teaspoonful and finally to 2 drams given every two hours. We observed no bad effects from this greatly increased amount, unless an occasional case of vomiting and rarely a feeling of weakness might be so attributed. We used several other preparations, but none of them were as pleasant to take as the emulsion in elixir of eriodictyon.

We shall endeavor in our future study to determine the minimum dose required and the best method of giving it.

At this point I wish to express my indebtedness to Prof. Arthur D. Hirschfelder for his many valuable suggestions and for furnishing the pharmaceutical preparations used.

SUMMARY REPORT OF CASES

Of forty-three patients there were thirty-five, or 81.3 per cent., who were relieved of pain. In twenty-seven cases, or 62.7 per cent., the pain was completely stopped, and in eight cases, or 18.5 per cent., the suffering was greatly relieved but not entirely eliminated.

In two cases, or 4.6 per cent., the pain was somewhat relieved, but to no great extent.

In six cases, or 13.9 per cent., there was no benefit whatever.

This study will continue as originally intended over a long period so that the volume of cases and repeated trials may give us sufficient basis for final conclusions; but the early results were so striking that we thought

a preliminary report should be made in order that the value of benzyl benzoate might be tried out by the profession at large.

We hope that the promise of this drug may lead many physicians to try it and that we may soon have numerous reports, for it is only by an analysis of a very large number of cases that we can determine the real value, and fix the limitations of benzyl benzoate as an antispasmodic in painful menstruation.

PATIENTS' TESTIMONIES

The most striking sidelight encountered was the answer to the question, "Does menstruation interfere with your usual duties?" Thirty-five, or 81.3 per cent., answered in the affirmative. To the question, "Must you go to bed?" twenty-nine, or 67 per cent., said they were compelled to do so, illustrating the economic value to be obtained by the relief of dysmenorrhea, to say nothing of the human suffering.

Thirty-three patients, or 76.7 per cent., had tried other treatment, but only eight, or 24.2 per cent., had obtained any relief. One of these I had dilated with absolutely no relief; however, one dose of benzyl benzoate stopped her pain entirely.

Fifteen cases were completely relieved of pain after one dose (2 teaspoonfuls of a 20 per cent. emulsion); twelve, after two doses at two hour intervals; one required three doses and one four doses and one five doses; those who obtained no relief took from two to six doses.

Other symptoms, headache, backache, etc., were not uniformly benefited.

The testimony of the patient in a condition like this is the only thing we have to go by in determining its efficacy; therefore a few statements by these young women will not be out of place. One said she could carry on her work with less difficulty and discomfort than usual, saying that "it took away that awfully

oppressive feeling, and interference with duties was less in quantity and duration," and her headaches were much relieved.

Another, Patient 7, asserted that she "was relieved entirely after the second dose and was able to eat during the first twenty-four hours," which she had been unable to do for several years.

Patient 13 was a woman, aged 40, with acute gonorrhea accompanied by cramps throughout the pelvis, which had lasted for two weeks. She was completely relieved after one dose.

Patient 16 said that after taking the medicine she "could do a good day's work, and life was worth living."

Patient 20 averred that for the first time she was not compelled to go to bed, and that the usual faintness and weakness were absent.

Patient 29 was one of the few persons not within the class of college women and nurses especially selected for study. She was a forewoman in an iron factory, compelled to be on her feet all day; but after taking the benzyl benzoate she was "able to keep working throughout the menstruation, which had never happened before."

RESULTS IN ESSENTIAL DYSMENORRHEA

We have obtained excellent results in all three of the classes set forth by Block: namely, obstructive, ovarian and vagotonic or spasmodic dysmenorrhea, and we also have had favorable reports in the so-called acquired type due to some demonstrable pelvic pathologic condition and even in the inflammatory type.

However, the most reliable results were obtained in the spasmodic type or essential dysmenorrhea, where benzyl benzoate has a distinct advantage over atropin, on account of its very low toxicity; furthermore, there are no drugs other than atropin and morphin which give so much promise of relief. Morphin we dare

not use; and if we have a nontoxic antispasmodic, it should certainly replace atropin, which is not entirely devoid of danger.

To be sure, benzyl benzoate only relieves a symptom and does not get at the underlying cause of painful menstruation; but dysmenorrhea is only a symptom after all, so until we have solved the problem of the etiology of painful menstruation we must continue to aim our shafts at the symptom. Wherever a cause can be found, of course, it should be removed; any pathologic condition of the pelvis must be corrected; but anteflection of the uterus as a real cause of obstruction is very doubtful in spite of the fact that many patients are relieved by dilatation. Far too many cervices are dilated.

Benzyl benzoate should be tried before dilatation or other pelvic operations are advised; and if it eventually proves to have the value it promises, many a woman will be saved an operation and more women will seek relief if surgery is not the only avenue of escape from suffering.

If this drug, in the final analysis, fulfils its promise, the sum of human suffering will be greatly reduced and a great economic asset acquired.

The prescription used is given herewith.

	Gm.
℞ Benzyl benzoate	10
Mucilage of acacia	5
Aromatic elixir of eriodictyon	35

Give from one-half to 2 teaspoonfuls, according to necessity.

CONCLUSIONS

1. The cause of dysmenorrhea is still unsettled.
2. The treatment has been unsatisfactory.
3. Antispasmodics are logically indicated, for in spite of doubtful etiology the painful spasm of the uterine muscle is incontrovertible.
4. Benzyl benzoate has an antispasmodic action and is practically nontoxic, which gives it preference over atropin.

5. This series is too small to permit conclusions, but is given for what it may be worth. Of the forty-three cases presented, in 81.3 per cent. the patients were relieved of painful menstruation.

6. Pain was absolutely eliminated in 62.7 per cent.

7. Pain was greatly relieved in 18.5 per cent.

8. Pain was slightly benefited in 4.6 per cent.

9. Pain was not relieved at all in 13.9 per cent.

10. These results, while not conclusive, warrant a thorough test, by the profession, of the value of benzyl benzoate in dysmenorrhea.

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ABSTRACT OF DISCUSSION

DR. EMIL NOVAK, Baltimore: While we do not know the cause of spasmodic dysmenorrhea, it seems fairly certain that the actual pain in these cases is due to spasmodic contraction of the uterine musculature. The logical symptomatic treatment, therefore, is the use of antispasmodic drugs. The two drugs which are most efficacious as antidysmenorrheics are the very two which should not be used, morphin and alcohol. Aside from these two, the drug which has in my hands been most valuable is atropin, to which Dr. Litzenberg has alluded in his paper. The general effect of benzyl benzoate would seem to be similar to that of atropin, and, if it is much less toxic than the latter, it would seem to be preferable to it. Such drug treatment of dysmenorrhea, however, is, after all, only a makeshift, and we should continue our effort to achieve a more rational therapy, which, I am convinced, will be along the lines of organotherapy. In practically all of these cases the uterus is the seat of defective development, in some cases very marked, in other cases slight. It is interesting to note that where the anatomic defect is least conspicuous, that is, in the so-called subpubescent cases, the dysmenorrhea is apt to be most severe, as I emphasized in a paper presented before this section last year. These developmental disorders are undoubtedly due to endocrine disorders which as yet are not well understood, but the problem is sure to be worked out sooner or later. Until this is done, the only course left for us in the management of these cases is the makeshift treatment of drugs, and the remedy advocated by Dr. Litzenberg should, therefore, constitute a valuable addition to our armamentarium.

DR. J. C. LITZENBERG, Minneapolis: I believe with Dr. Novak that we should not shirk treatment just because we

have not found the cause of the condition. Neither should the obtaining of relief for pain lead us to relax our efforts to find the cause. Of course, our remedies are makeshifts. We can aim at the symptom because we do not know the cause. The use of epinephrin is along the line of counteracting the ovarian type of dysmenorrhea. The profession generally neglects the ordinary means of treating dysmenorrhea. The superintendent of the University Hospital told me that more than 50 per cent. of the nurses lose their dysmenorrhea when they get on the floors of the hospital. The physical exercise, interest in their work and the hygienic living correct a large part of the difficulty. In the treatment of this condition, physical exercise and hygienic treatment are neglected. The majority of young women do not come for treatment. Many suffer in the privacy of their own homes because of innate modesty or because of their desire to play the game of womanhood bravely. They get a prescription, not a study, and I want to emphasize the idea of study brought out by Dr. Novak. The cases should be classified and treated according to the class in which they may fall. Of course, this is only a theoretical classification, but if they are studied and the hygienic measures alone are used one half of these women would be relieved. In those cases with very great pain, this newly discovered action of a well known substance certainly ought to be used because it is a substitute for three dangerous drugs—morphin, alcohol and atropin.

TREATMENT OF THE SEVERE VOMITINGS OF EARLY PREGNANCY*

FRANK W. LYNCH, M.D.
SAN FRANCISCO

It seems well worthy of comment that, in spite of the fact that nausea and vomiting have occurred during pregnancy from time immemorial, it is only within the last hundred years that the idea has gradually developed that vomiting in pregnancy might occasionally become so persistent as to lead to death. It is equally remarkable that, although Simmons in 1813 first induced abortion for its relief and that his example was followed shortly by a comparatively small number of others, the justifiability of this measure was not prominently considered by an important medical body until nearly fifty years later when the papers of Dubois and Danyan were read before the Academy of Medicine in March, 1852.

Since then there has accrued a considerable literature embracing a multitude of ideas concerning the etiology and treatment; yet out of this mass of confusing and contradictory statements the teachings of two men shine out most clearly: Matthews Duncan (1879), who warned to clearly distinguish between the vomiting in and the vomiting of pregnancy, and Fischl (1884), who wrote that even though it appeared that the vomiting of pregnancy might be either essential or symptomatic, the former would become more and more rare as the cases were more carefully investigated.

FREQUENCY OF PREGNANCY

It is difficult to estimate the frequency either of the ordinary morning sickness or of the serious vomitings, since both occur more frequently in America, France,

* From the Woman's Clinic, University of California Hospital.

England and Russia than in Germany, a fact which has been emphasized by those who see only a neurotic factor for its causation. Horwitz in Petrograd (1883) reported a history of some form of nausea and vomiting in 84 per cent. of his cases (morning sickness): Giles in London (1893) found 47 per cent.; and Gerst in Paris (1903) noted it in 66 per cent. I have found similar histories in 45 per cent. of 500 of my recent clinic cases at the University of California; 123 of 249 primiparas and 103 of 251 multiparas giving a history of nausea and vomiting, while in 46 cases, or 9 per cent. of the same series, there was a history of nausea without vomiting. In 500 private cases, exclusive of those referred for treatment of vomiting, 58 per cent. gave me a history of nausea and vomiting. It is even more difficult to ascertain the frequency of the serious types.

The small percentage of serious cases in Germany is quite remarkable. Carl Braun stated that he had not seen a fatal case in a series of 150,000 pregnancies. Similar statements are made by Höhl, Lomer, Frank and Strassman, although Guéniot (1863) collected from the French literature forty-six fatalities in a series of 118 cases of pernicious vomiting and McClintock (1872) reported fifty fatal cases in England. Yet even as recently as 1914, Bondy reports only twenty-one cases of pernicious vomiting in 10,000 obstetric cases in Breslau and quotes Baisch's series of twenty cases in 20,000 cases in Munich, and von Herf's report of thirty cases in 17,000, expressing his surprise that his cases were observed in married and multiparous women since he had been of the belief that the condition was apt to occur only in illegitimate primiparas. Yet these figures may not give a correct idea of the incidence of the disease in German countries since they are drawn entirely from hospital experience, and few believe that Pick's frequency of one case in 1,000 obstetric cases in Berlin represents the true fre-

quency, since nearly every practitioner of experience here has met with several serious cases. In this country, Williams states that he observed only two cases in 5,000 clinic cases in his service at Baltimore, although he had studied comparatively large series in private cases during the same period. In 2,750 clinic cases at the University of California Hospital, fourteen entered for the treatment of vomiting, nearly all presenting during the last three years.

ETIOLOGY

Little is known of the etiology of this condition. Many factors have been urged as causative but do not stand careful scrutiny. A careful survey of the facts in hand forces one to conclude that, under certain conditions and in some way at present unknown, the maternal organism is sensitized to vomiting by the state of pregnancy. This conclusion seems rational because, after the exclusion of chronic appendicitis, ulcer and other stomach and intestinal conditions which cause vomiting even in the nonpregnant woman and which may consequently be a factor in certain of the vomitings during pregnancy, there remains a class of cases in the great majority of which we cannot demonstrate conditions named in the texts as etiologic factors.

PATHOLOGY

The pathologic picture varies within wide limits, yet the liver is the seat of the most important changes. The milder cases of vomiting which come to accidental death present little more than cloudy swelling of the parenchymatous tissue. Yet nearly all the cases of vomiting which result fatally present structural changes in the liver ranging from the simple fatty forms to those characteristic of acute yellow atrophy. The most marked type presents degenerative changes which begin about the central vein of the lobule and gradually extend toward its periphery.

The serious vomitings of pregnancy have been classified clinically under many headings. The chronic and acute forms have been recognized for many years, the former as a slow and gradual development from the more severe type of morning sickness which rarely changes type until late in the disease, and the latter with acute onset and rapid progression soon characterized by extreme prostration and a fecal type of vomiting. Quite naturally attempts were very early made to establish a classification on etiologic grounds and the serious vomitings have been grouped accordingly as due to reflex-neurotic or toxemic causes. The chronic forms mentioned above correspond usually to the reflex-neurotic group which essentially is nontoxic in type in contradistinction to the acute forms which are frankly toxemic. Yet the whole question of clinical classification hinges largely on the pathology, which appears to countenance the clinical divisions, since patients dying from the neurotic-reflex nontoxic or chronic groupings present liver changes of the simpler types, whereas the liver changes are most marked in the cases of the toxemic group. Yet the whole question is not so simple as would first appear, because deaths in the chronic groupings are comparatively rare and are even more infrequently investigated by careful necropsy. Moreover, patients dying of the toxemic type of vomiting occasionally present only liver changes of comparatively slight forms which are in no way suggestive of the lesions of acute yellow atrophy so often encountered. So it is quite problematic whether the pathologic picture presented in the liver of those who die of any or all types of the serious vomitings represents various progressive stages of the same process.

The importance of the liver in the pathology of the disease was presented as early as 1879 by Matthews Duncan, but was lost sight of almost immediately until revived by the cases of Stone and Williams in 1901 and

1902. Many have turned their attention to study of the liver function, but thus far no one method has given assurance of accuracy. The study of the urinary-ammonia-nitrogen was early undertaken with the hope that it might prove an index of liver destruction, a hope which has gradually been disproved. Yet it remains without question that any method which would differentiate the approaching toxemia before the advent of clinical symptoms would be of inestimable value since clinically we cannot tell with certainty whether any given case is destined to end with death or recovery. The confusion obtains usually in the slowly progressive chronic varieties which are not usually considered toxemic and are often interrupted by marked periods of improvement, yet which occasionally change type and become frankly toxemic. We have seen several such cases in which the change of type was caused apparently by the anesthetic necessary for abdominal operation during this disease. The discovery of a method, therefore, which would enable the practitioner to determine the advent of toxemic symptoms would standardize the proper use of therapeutic abortion and ensure its employment sufficiently early to save life and at the same time permit it to be deferred until the patient had been given every reasonable chance to carry out the pregnancy.

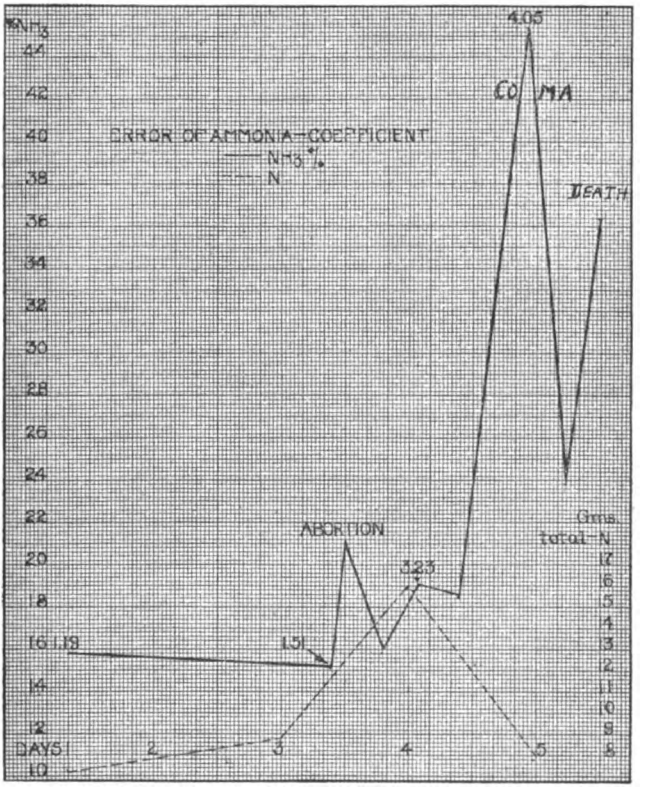
It is a mark of wisdom of American teaching that abortion is resorted to early rather than late when the patient does not respond to the ordinary therapeusis. Yet this treatment, while safe, is undoubtedly unsatisfactory, in that, contrary to the opinion of Tarnier and Budin, the disease tends to recur in subsequent pregnancies. It therefore follows that men who are interested in this problem nearly always have in charge patients who have aborted in the past but who are willing to endure even considerable risk of life to secure a living child.

DOCTRINE OF AMMONIA COEFFICIENT

Several investigators had studied the partitions of the urinary nitrogen in the toxemias of pregnancy without convincing conclusions prior to 1905, although Whitney's observations on a small series of eclampsia cases strongly suggested that an increase of the ammonia coefficient in that disease might be a protective measure. Folin's observations on thirty normal urines and their variations following changes of diet had not been recorded when Williams undertook the investigation of the urine in a series of vomitings of pregnancy. Williams found that there was a marked difference in the ammonia coefficient in the cases of the reflex-neurotic and the toxemic types, the former remaining at normal limits whereas the latter ascended to 32, 38.5 and 46 per cent., respectively, in three of his cases. After a careful review of the literature, he confessed his inability to determine the cause since there was an absolute lack of knowledge concerning the toxic material at fault and whether it was derived from mother or fetus. Whether it was merely a manifestation of an acid intoxication or the inability of the diseased liver to effect complete oxidization, future investigation might determine. Numerous investigations by other observers have confirmed his observation in part, some, as Underhill and Rand, concluding that the increase in the urinary ammonia nitrogen was indicative merely of an acidosis of starvation, while others have controverted the theory, stating that the toxemic type may exist without such a resulting condition. Since that time, we have learned much concerning the formation of ammonia. We recognize that it is influenced profoundly by the type of diet and by medication and by other factors, that it probably is not an index of the liver functions, but that the fact remains that it is increased in the condition of acidosis, and serves the purpose of saving alkali for the body.

ERRORS OF AMMONIA COEFFICIENT

My observations, begun shortly following Williams' investigations, have convinced me of the general truth of his work; namely, that the more serious vomitings are characterized by an increase of urinary ammonia, yet because of many factors influencing the coefficient it is better to state the ammonia nitrogen in terms of



The absolute amounts of ammonia are printed on the curve of the ammonia coefficient. Had it been charted, the curve would have given warning of the seriousness of the case one day before the rise in the ammonia coefficient did so. After the abortion the coefficient fell (because the total nitrogen had risen) to what was considered a safe margin. In reality, the ammonia had not fallen but had increased in absolute amount from 1.51 gm. to 3.23 gm. without marked disturbance in the ammonia coefficient. The case is taken from literature.

absolute amounts, since without this control the ammonia coefficient occasionally may be misleading. The coefficient is the proportion of the total urinary nitrogen that presents as ammonia. If the absolute amount of ammonia remains stationary, the coefficient will decrease with an increase of total nitrogen and will increase with the fall. This is clearly shown by Folin when presenting the variations seen in health. Under a diet giving 16 gm. of total urinary nitrogen, the ammonia weighed 0.7 gm., giving an ammonia coefficient of 4.3 per cent. When the patient was given a nitrogen-free diet only 3.6 gm. of total nitrogen appeared in the urine. The ammonia nitrogen weighed 0.42 gm. yet constituted 11.3 per cent. of the total nitrogen. That is to say that the ammonia coefficient rose from 4.3 to 11.3 per cent. in spite of an actual reduction in the absolute amount of the ammonia, the change being accomplished largely by the fall of total nitrogen. Yet without all of these figures, the rise of the ammonia coefficient might be taken as an indication of a beginning acidosis. A further example of the occasional failure of the ammonia coefficient to express the true facts is shown by the accompanying chart.

If the total nitrogen remains stationary and the ammonia increases in amount, the ammonia coefficient increases, thus resembling the curve of the increase of ammonia by weight. Yet this condition is not frequently seen in the severe types of vomiting.

Because of the restriction of food, the total nitrogen in the urine comes largely from the breaking down of body tissues. Comparatively little nitrogenous tissue breaks down early in starvation since the loss in weight depends in large part on loss of fats, the fatty acids being oxidized largely by the action of the glycogen stored in the liver. We should expect, therefore, variations in the partitions of the urinary nitrogen in fat and thin subjects, dependent in turn on the relative amounts of carbohydrates stored in the body suitable

for oxidization of the resulting fatty acids. The character of the last food ingested is also important, since Voit has shown that in a dog the influence of the last meals persisted for the first six days of starvation.

ACIDOSIS IN NORMAL PREGNANCY

Realizing that urinary ammonia gives at best a poor record of the acidosis, I had Emge in my clinic undertake a series of investigations to determine the acidity of the blood in normal pregnancy. His work, reported in 1916, and since then confirmed by others, shows that there commonly exists in normal pregnancy an acidosis, as shown by the tension of the carbon dioxid of the blood in the method of Van Slyke, yet that the blood readings of the majority of our vomiting series fell within the same range as cases considered clinically as normal. A smaller number of cases presented readings at the other end of the scale, reading as high normal, whether as a result of medication (alkalis) or not, we do not know. Our investigation of the total nonprotein nitrogen and the urea nitrogen of the blood show normal limits for all cases.

URINARY AMMONIA IN NORMAL EARLY PREGNANCY

Some years ago, R. W. Webster and myself investigated the partition of the urinary nitrogen in four normal patients, two or three months pregnant, who had not vomited and had only very slight and infrequent nausea. Two were nulliparas and two were multiparas, one of each pair was slight and the other somewhat stout. Both multiparas could be classed as neurotic. The diet was mixed and was calculated for 10 gm. of nitrogen for the two women weighing under 120 pounds and 14 gm. for the two women weighing more than 150 pounds. The urine was followed for three successive days, yet since they present the same range we will record only one. One case in the fifth month of pregnancy was selected for observation and followed

from that time throughout, with daily study during the last thirty days. The diet in this case was not controlled. We also have as other controls a urinary investigation in a woman five months pregnant who was threatening abortion, and two observations on an early pregnancy complicated by a duodenal ulcer which had long caused vomiting.

TABLE 1.—CONTROLS FOR VOMITING OF PREGNANCY, NORMAL EARLY PREGNANCY

	Case 1, Primipara, 2/12/12, 640 c.c., 1.032 Specific Gravity, 25 degrees Acidity		Case 2, Primipara, 1/31/12, 925 c.c., 1.025 Specific Gravity, 32 degrees Acidity	
	Gm.	Per Cent.	Gm.	Per Cent.
Nitrogen	7.8	.....	12.184	.....
Urea	14.08	84.29	22.99	88.1
Ammonia	0.665	7.02	0.564	3.81
Uric acid	0.523	2.23	0.7314	2.0
Creatinin	1.037	4.94	1.316	4.0
Amido-acid	0.363	0.87	0.561	0.87
Undetermined	.....	0.65	.....	1.2
	Case 3, Multipara, 2/1/12, 860 c.c., 1.022 Specific Gravity, 24 degrees Acidity, Trace Indican		**Case 4, Multipara, 2/7/12, 2,160 c.c., 1.012 Specific Gravity, 18 degrees Acidity, Trace Indican**	
	Gm.	Per Cent.	Gm.	Per Cent.
Nitrogen	8.723	.....	11.19	.....
Urea	16.25	86.9	19.44	81.1
Ammonia	0.644	6.08	0.72	5.29
Uric acid	0.503	1.92	0.92	2.74
Creatinin	0.819	3.49	1.75	6.72
Amido-acid	0.429	0.92	0.884	1.47
Undetermined	.....	0.60	.....	2.65

TABLE 2.—NORMAL PREGNANCY, LAST HALF OF PREGNANCY

	6/26/11	8/4	10/10	11/9	11/29	12/12	12/27	1/4/12
Total N.	9.12	12.3	10.95	11.04	11.19	11.15	11.03	12.06
Urea	16.5	22.4	19.5	20.01	19.4	19.8	20.4	22.4
Ammonia	0.25	0.73	0.54	0.30	0.72	0.89	0.53	0.54
Uric acid	....	....	0.79	0.77	0.92	0.88	0.85	0.55
Creatinin	....	....	1.58	1.56	1.75	1.76	1.49	1.58
Amido-acids	....	....	2.17	2.73	0.89	0.27	0.57	0.43
Chlorids, NaCl	...	....	....	....	....	....	....	14.78

TABLE 3.—FIVE MONTHS' PREGNANCY THREATENING ABORTION

Day	Fluid Intake, C.c.	Urine, C.c.	Total N, Gm.	Urea N, Gm.	Ammonia N, Gm.	Creatinin, Gm.	N in Diet, Gm.
1	1,000	860	5.27	4.36	0.45	0.38	10.9
2	1,050	650	6.82	5.24	0.36	0.52	6.9
3	750	1,190	8.33	5.98	0.61	0.78	12.3
4	1,200	830	3.71	3.18	0.21	0.22	8.1
5	Aborted spontaneously						

TABLE 4.—VOMITING FROM DUODENAL ULCER WHEN THREE MONTHS PREGNANT

Nitrogen	4.18 gm.
Ammonia	0.459
After one week's interval and treatment:	
Blood carbonates	46.0
Ammonia	0.21

Subsequent Admission 2 Years Later, 3 Months Pregnant

Fluid Output	Ammonia	Urea	Creatinin	Total N.	N. Consumed
970	0.19	3.04	0.48	4.48	
2,450	0.49	3.96	0.56	5.21	
610	0.10	3.38	0.57	4.38	6.6
1,150	0.16	2.96	0.58	4.41	6.6
780	0.09	1.66	0.47	2.96*	6.6
1,000	0.16	2.97	0.54	4.76	6.6
1,110	0.15	4.20	0.45	5.96	7.6

* One specimen lost.

RANGE OF URINARY AMMONIA IN SEVERE VOMITING OF PREGNANCY

From the foregoing it is evident that the case as presented by Williams stands or falls with the ammonia content of the fatal cases, or those aborted at the eleventh hour to avoid impending death. Personally, in more than forty examinations of cases which R. W. Webster and myself, or I myself, or my technician working with me, have made, I have never seen a patient adjudged by clinical means as in danger of life with urinary ammonia of normal limits. The fact that high ammonia is occasionally seen in cases that do not give symptoms of marked toxicity in no way impairs the truth of the general statement, since the loss of fatty tissues, the glycogen content of the liver and muscles, the character of the food retained, the type of medication employed, all constitute factors that must be considered in any given case. We have found a total nitrogen range from 3.6 gm. to 8 gm., and an ammonia variation between 1.8 and 3.1 gm. in twenty cases of the severe type of vomiting. Lower ammonia readings were found in a considerable number of patients who, although they stated that they had had constant vomiting before our study, did not vomit to any considerable extent while under our observation and treatment. One patient with a fairly severe, long protracted and stubborn type showed a rather low

range of ammonia (about 1.5 gm.) and finally aborted two months after our first observations. One very severe case in which abortion was induced because of unfavorable symptoms presented 1.8 gm. of ammonia and 4.4 gm. of nitrogen just before the abortion. The history stated that she had been ill for more than two months and had retained no food for more than a week (the latter statement we consider somewhat doubtful). The urine contained much acetone and diacetic acid, a faint trace of albumin and many granular casts; leucin and tyrosin were found without effort made to concentrate the bulk. The toxic features of this case were further suggested in that, while the vomiting ceased after the abortion done under local and analgesic nitrous oxid-oxygen, death following an acute paralysis of the Landry type, complicated by Korsakoff's syndrome, occurred three weeks later.

URINARY AMMONIA IN STARVATION

The question now arises as to whether this increased ammonia is indicative merely of the acidosis of starvation as suggested by Underhill. No student of the metabolism in cases of pernicious vomiting can doubt for a moment that starvation enters largely into the picture, but I cannot see how any can believe that it is responsible for the entire change, since the ranges of ammonia seen in actual starvation are greatly exceeded by those encountered in the vomitings. The absolute amounts of ammonia nitrogen excreted in Bonniger and Mohrs' fasting woman Schenk ranged from 0.40 gm. on the second day to a maximum of 1.84 gm. on the seventh day of the fast. Benedict's subject L. gave similar findings, 0.41 gm. on the first day with a maximum of 1.94 gm. on the seventeenth day, an amount in excess of that of Beauté in Cathcart's research and of Brugsch on Succi. The maximum ammonia coefficient in Benedict's fasting case is 21.79 per cent.; in Williams' vomiting case, 46 per cent. The rapid fall in the ammonia in Benedict's subject after taking food is of

the greatest interest (from 1.24 to 0.69 gm. on breaking a fast of thirty-one days). Yet these observations are made on individuals who are about on their feet. On the other hand, you quite commonly encounter ammonia nitrogen of more than 2.4 gm. in vomiting cases in which the patients have been in bed for days and who have retained some food by mouth to say nothing of glucose by blood or by rectum. Moreover, the total nitrogen often falls below that encountered in any record in starvation, excepting only Freunds observations of Succi which are not acceptable to later workers. It is unfortunate that no professional faster has been content to present for study while on a nitrogen-free diet, which would give another angle for comparison, much needed for complete controls.

So it appears as follows: There is an acidosis in pregnancy as evidenced by the reading of the carbon dioxid tension of the blood, yet the tension of the vomiting cases does not exceed that of normal cases in which there is no vomiting. The ammonia nitrogen of our normal pregnant controls ranges around 0.5 gm. In vomiting from ulcer in pregnancy it also ranges low, whereas in vomiting cases it exceeds that noted in any series of actual fasting.

Finally, therefore, it appears that the crux of the question lies in the point as to whether in a vomiting case presenting ammonia nitrogen in excess of that seen after many days of actual fasting there is a return to normal limits with the cure of the vomiting and the preservation of pregnancy. Williams' observations show that it does so after abortion. My observations indicate that it does so return after proper treatment and with the preservation of pregnancy, as evinced by the typical case summarized in Table 5.

The simpler nausea and vomiting cases in early pregnancy correspond in large part to the clinical picture of the so-called neuroses of the stomach. We may encounter all types. The most common one suggests the hyperacidity group in that the vomiting ordinarily

occurs at the height of digestion. Almost invariably they are relieved temporarily by taking food. The mouth is acid to litmus. The eructations are acid. Constipation is the rule, almost without exception.

TABLE 5.—PERNICIOUS VOMITING; TEN WEEKS' PREGNANCY; RETURN TO NORMAL URINARY METABOLISM AFTER TREATMENT

	Jan. 13, 1912, vomited 12 times, 580 c.c. turbid urine, 1.026 specific gravity, trace nucleo-albumin, a few hyaline casts, much acetone, considerable indican, no lactic		Jan. 16, vomited 4 times, 630 c.c. turbid urine, 1.026 specific gravity, no albumins, no casts, much acetone, considerable indican	
	Gm.	Per Cent.	Gm.	Per Cent.
Nitrogen	5.84	.....	9.83	.....
Urea	12.24	71.0	15.92	75.6
Ammonia	1.67	23.6	2.33	19.96
Uric acid	0.042	1.39	0.033	0.11
Creatinin	0.048	1.77	0.514	1.94
Amido-acids	0.434	1.38	0.848	1.61
Undetermined	.....	0.88	.....	0.73

	Jan. 17, vomited 2 times, 610 c.c. very turbid urine, sp. gr. 1.029, no albumins, no casts, large excess indican, much acetone, no lactic		Jan. 21, did not vomit, 450 c.c. very turbid urine, specific gravity 1.022, no albumins, no casts, slight excess indican, strongly + acetones	
	Gm.	Per Cent.	Gm.	Per Cent.
Nitrogen	10.63	.....	6.14	.....
Urea	16.83	73.9	10.18	77.4
Ammonia	2.47	19.15	1.25	16.75
Uric acid	0.293	0.91	0.05	0.27
Creatinin	0.617	3.81	0.607	3.67
Amido-acids	0.495	0.87	0.273	0.83
Undetermined	.....	1.33	.....	1.06

	Jan. 24, 580 c.c. turbid urine, specific gravity 1.024, no albumin nor casts, trace indican, slight acetones	
	Gm.	Per Cent.
Nitrogen	4.68	....
Urea	8.537	85.3
Ammonia	0.375	6.43
Uric acid	0.2566	1.82
Creatinin	0.552	4.38
Amido-acids	0.304	1.21
Undetermined	.....	0.91

CYCLES OF VOMITING

There are usually three periods in which the nausea is most marked. The most common period is the early morning; the second is late in the afternoon, and the third is shortly before noon. At first the patient con-

forms to one type alone, but later she may vomit at all three periods, and subsequently after meals as well. Gastric analysis shows increase of acids. Motor neuroses are common. The patient is worse in the morning because of the long fast during the night, although the stomach usually empties itself in a normal manner during this interval, so that the morning vomitus is chiefly acid mucus. Yet occasionally the pylorus becomes so irritated by the acid secretions during the night fast as to close in spasms with retention of larger amounts of the offending fluids, which are vomited shortly after arising. Vomiting may also occur immediately after taking food. The nausea in the late afternoon is common in patients who eat a scanty pickup luncheon, often most badly selected. The type of patient whose usual breakfast is coffee and rolls gives a wave of nausea about eleven in the morning.

Yet all cases do not belong to this category and the subacidity type is not uncommon. Indeed, the most troublesome cases are often in this group, which often present as primary and without an acid mouth or increased stomach acidity. Yet it would appear that cases which sometimes begin as hyperacid types may change to the subacid type after long standing.

TREATMENT

The successful treatment demands a most rigid attention to details and no item is too slight to merit attention. I cannot urge too strongly a careful study of the gastric secretions and titration of all vomitus. Nothing seems more ridiculous than to pass all patients by with the statement that a pregnant woman must expect to vomit.

It follows without question that we should search with the greatest care for any of the conditions which texts mention as causal factors. Posterior displacements should be corrected and held up by pessaries, although I have never seen relief follow such measures alone. The care of the bowels is exceedingly impor-

tant and there is much opportunity for skill in the treatment of the troublesome constipation, since cathartics are not usually well borne. We should restrict medication by mouth to the few drugs later mentioned. There is, of course, no need of emphasizing the necessity of proper hygiene, well constructed clothing, proper ventilation and the avoidance of excitement.

VOMITING AS A NERVOUS HABIT

I am of the firm belief that the formation of a nervous habit of vomiting accounts for the great majority of the cases of moderate severity which develop from morning sickness, since there is nothing more easy to acquire than the habit of vomiting in the presence of nausea. We should seek, therefore, to break this habit and to treat, at the same time, the underlying cause of hyperacidity or subacidity, in part by medicine but chiefly by a type of food which, while easy to digest, is difficult to vomit. We must not expect to secure good results unless there is absolute rest and quiet. Hospital care is most advisable and a stay of more than ten days is rarely necessary. It is most difficult to treat successfully a patient surrounded by her family and with the weight of household cares even though she is in bed and under a nurse's care. A good start is necessary and it is seldom obtained while the patient is at home.

The patient is put to bed. All food and drink by mouth is stopped until there has been no vomiting for twenty-four hours. The bowels are kept open by a daily high colonic flushing. The patient is put under the influence of large doses of bromid given by rectum, beginning with 40 to 60 grains every four hours. A solution of glucose and soda is given by rectum. We have long since found that these are best given in doses of 8 to 10 ounces at fixed intervals since the drip method soon causes irritation. It is exceedingly important to assure the patient that she will retain the first meal given, to explain the plan of treatment, and to

warn her against vomiting when she is nauseated. It should be explained that the vomiting habit is very easy to form, but very difficult to break.

The type of food varies within limits yet at no time should it include fruits or sweets. It is necessary that it should be given as dry as possible and the meal should be of the solid type. The hyperacidity group responds quickly to a diet of proteins, limited fats and restricted carbohydrates. The glucose by rectum supplies the deficiency of the carbohydrates, while the sodium bicarbonate is used to neutralize the acidosis. I have found nothing as useful as the diet of meats, twice toasted bread with butter, and a small amount of milk and cream, to be taken as a ration, all or none. A patient should begin with at least four such meals a day. Fluids by mouth are withheld for many days and until the diet has been extended to include vegetables. Then we may give alternatively solid and fluid meals—in small amounts and at frequent intervals.

There are many objections to this type of diet which quickly palls because of the restricted choice of meats, since broiled steak, roast beef and slightly cooked scraped beef must constitute the standby for several days. Yet a patient will usually take it until the most distressing time has passed, when other meats may be added. The diet for the subacid type is far more difficult and should be more mixed with fewer meats. The bromids are now gradually reduced and soda and magnesia are given in capsules by mouth during the period of digestion. With the exception of occasional pills, given with meals, I have found no other drug of the slightest value except ingluvin.

It seems most remarkable to me that so little attention has been paid to the diet. Nearly all texts advise milk and other fluids which are not only easy to vomit but which react occasionally in a somewhat toxic manner, a point recently emphasized by Tweedy of the Rotunda. The chief qualification is that the food shall be solid, dry and in small amounts. Years ago I was

impressed by the manner in which a steward on an Atlantic liner treated seasickness in a fellow passenger. For the first meal he gave a chop. "It will stay down," he said, "one vomits liquids easily."

Patients invariably suffer from a parched mouth and demand acid drinks. They clamor for drinks of lemon and orange, yet some very sharp mouth wash helps out wonderfully. The sweeter type of mouth wash usually nauseates. I cannot emphasize too strongly the necessity for the most careful observation of details. A nurse may give a low enema instead of a colonic flushing. Some one invariably brings grapefruit which promptly causes vomiting. The patient is so thirsty that she will drink the water from the finger bowl or reject the solid food and take only the milk and cream. One must obtain the patient's confidence. Yet this treatment rarely fails when properly controlled in chronic cases. It should not be attempted with the fulminating type of case nor with one with black vomit or other signs of toxemia. These should be aborted without delay and very often one is too late. Gastric lavage is seldom helpful as an adjuvant to the treatment.

The question naturally arises as to what constitutes a safe limit of urinary ammonia. We cannot answer. Yet it seems rational to treat the acidosis as well as the actual vomiting when the ammonia runs very high and to induce abortion in the presence of unfavorable symptoms. We should constantly keep in mind the resemblance to the ammonia excretion in diabetes. Ringer's solution gives excellent results given alternately with the glucose-soda solution since it does more to quench the thirst and is most valuable in the treatment. I have had no results with injections of normal pregnant serum, as advocated by Freund and others, in any case which did not respond to our treatment. There is some doubt as to the basis for the injection of normal pregnant serum. Many claim that it depends chiefly on the blood content of calcium. Epinephrin has not proved of value in my hands nor has corpus

luteum. With an acidosis not influenced by the treatment and with a continuance of severe symptoms, we should resort to abortion. More latitude may be given a case of equal clinical severity that does not present marked acidosis. We should aim in the beginning to keep on the safe side. To this extent, I believe we should rely on the study of urinary ammonia.

It may be urged that ammonia determinations are complicated procedures which in consequence must be done by a trained chemist. Yet the newer methods of Folin and Van Slyke have done much to solve this problem. Hospital interns are now taught them as a routine and even if they are not so taught a case may be controlled by titrations with formaldehyd solution, which are sufficiently accurate for clinical purposes and easy to do.

There has been considerable confusion as to the meaning of the jaundice that has often been noted in toxemias shortly before death, yet there are cases on record in which necropsy revealed most extensive liver lesions without the presence of jaundice as a symptom. Moreover, we may meet it occasionally in the simpler cases of vomiting in which case the jaundice is catarrhal in type, doubtless owing to the extension of an infection of the duodenum as a purely accidental condition.

THE METHOD OF ABORTION

The method of abortion is entitled to the most serious consideration if that treatment is finally chosen, since there is little doubt that it occasionally causes death in very serious cases, partially because of the shock following ill chosen methods but largely because of the drug used for anesthesia. No one who has followed the work of Whipple, Graham and others on chloroform poisonings can conclude other than that chloroform has been responsible for many of the lesions in many of the cases of the acute yellow atrophy type, not necessarily as a primary cause but certainly as contributory. Chloroform is absolutely contraindi-

cated in any case in which it would appear that the liver has used up most of its glycogen. It will certainly cause serious damage to a liver already the seat of a pathologic process. Ether is objectionable, partially because of the acidosis which its use entails but chiefly because it adds to the vomiting. Local anesthesia suffices for nearly all necessary procedures. It may be augmented by nitrous oxid and oxygen in analgesic doses, never given to the anesthetic degree. The greatest care should be taken to keep the patient in the twilight stage and not to permit loss of consciousness. The method of procedure is equally important and deserves the most careful consideration since the patient may have advanced so far in pregnancy that you may not remove the fetus through the dilatation obtained by Hegar catheters. Vaginal hysterotomy may then be indicated, especially if the cervix is long and high. Yet we must keep in mind the possibility of infection since the resistance of the patient is usually so low. Bags may be used, yet they, like packing, often augment the symptoms of many cases. Do everything possible to avoid catheterization, since bladder infection and pyelitis may be the source of an infection responsible for the severest type of neuritis.

Few conditions, therefore, may offer more opportunity for proper treatment. Yet, so long as both the medical profession and the laity alike believe that a pregnant woman must expect to endure nausea and vomiting, we may expect to give treatment in serious cases.

ABSTRACT OF DISCUSSION

DR. ALFRED BAKER SPALDING, San Francisco: It is hard to discuss this paper because we know so little about the etiology and we have so many personal opinions about treatment. We know that every woman who becomes pregnant is more or less toxic. We know that about 60 per cent. start to vomit from reverse peristalsis, beginning with constipation and ending in vomiting. Two tenths of 1 per cent. will have serious vomiting. Occasionally a woman dies. I have seen one death. It is unusual to see a woman die from this condition. Why do these women vomit, and

why do they become seriously ill, and why do they die? All we know in regard to the pregnancy is that there is a foreign element developing in the ovum against which the body reacts producing symptoms in some persons but not in others. Autosuggestion has an influence, for in some cases even the husband starts to vomit. I do not believe all women are in the same condition for pregnancy. Some women are well and strong, and I believe much in the rôle of focal infections in the pregnant woman. I am convinced that the teeth form the basis of many of the abnormalities seen in pregnancy, particularly in regard to vomiting and in regard to the high blood pressure and other toxic conditions of later pregnancy. In the record of fatal cases reported by J. Whitridge Williams some years ago I saw that one patient just before death had had a severe tonsillitis. In another case the patient was found at necropsy to have had an ulcer of the vagina. A patient of my own, who in three pregnancies had vomited excessively, has had severe gonorrheal inflammation because her husband would not be cured. An interesting point in this case is that with the cautery I have cleaned up the cervix so that it looks like the cercix of a woman who never had a child. It is now about the fifth month of pregnancy and the woman has not vomited once. This leads me to believe that some of the cases are due to focal infection. As to the urinary nitrogen, in one case during the period of treatment from July 22 to August 12, the total amount of urine was a little under the normal until we aborted the patient. The nitrogen started at 6 gm. but dropped until the day before we aborted her to 2 gm. An interesting fact in this case was that the nitrogen coefficient increased from 10 to 37 per cent., while the patient clinically was very sick. This brings out Williams' idea and we based our treatment on the report of his cases. There is great need for some functional test of the liver. Unfortunately, the liver may be largely destroyed and yet functionate. In this particular case we tried the test for urobilin and urobilinogen. Two examinations were made. One of these was made early and showed only slightly increased urobilin in the urine. The day before we aborted her urobilin was present in the urine to the thirteenth dilution.

Dr. Elnora C. Folkmar, Washington, D. C.: I wish to call attention to the fact that we may sometimes make use of other means than drugs and diet or treatment by abortion to relieve the patient of these distressing symptoms. Within the past year I have had six cases of nausea of pregnancy. Three of these cases had reached the point at which I felt it was wise to place them in a hospital and have laboratory tests made, but before doing so I tried the use of body radiation with actinic rays, making approximately ten treatments on ten successive days. In each case the vomiting

ceased within the ten days and the patient felt perfectly well. Just how this was brought about we did not know. The study of the effect of light on metabolism is not fully known. We do know that the application of the actinic rays in some way brought metabolism to nearly a normal condition. We know that the rays increase oxidization.

DR. FRANK W. LYNCH, San Francisco: I should like to emphasize a few points concerning the use of ammonia in selecting cases for medical treatment. While we do not believe for a moment that the urinary ammonia is the best indication of the extent of the acidosis, we have found it to be a better clinical guide than the carbon dioxid tension of the blood. We have not yet studied a series of cases controlled by the study of alveolar air. The ammonia nitrogen in the urine does not appear to be so quickly influenced by treatment with soda bicarbonate as the carbon dioxid blood tension, and nearly all cases presenting for treatment have had large doses of soda. Many of our cases which have had soda treatment have had high normal (60) carbon dioxid tension and yet their urinary ammonia has been greatly in excesse of that deemed the highest normal limit. The carbon dioxid blood tension quite naturally varies, depending on the condition of the body cells and the fluids which come from around them to form blood plasma. If the acidosis as expressed by the urinary ammonia appears to be controlled, we will persist longer in our treatment in spite of the vomiting than if the ammonia ran extremely high with equally bad clinical symptoms. Yet under no circumstances would we continue medical treatment if the patient had the so-called black vomit. There are no cases accepted by students of metabolism in which the total urinary nitrogen in actual fasting has fallen below 3 gm. The case of Succi investigated by the Freunds nearly twenty years ago in Vienna is not now accepted since the methods then used were not possibly so accurate as at the present. Yet in many of our cases as in that of Dr. Spalding we have found lower total urinary nitrogen than any observation in actual fasting. We are somewhat skeptic of these observations. Yet it appears that we should not expect to have as much breakdown of protein tissue when we use tissue sparing food, which nearly all vomiting cases retain by rectum, as in cases of actual fasting. We do not know, however, to what extent the condition causing vomiting may break down protein material, whether more than in actual fasting, as seems likely, or not. It is unfortunate that we have no good records as controls of partial fastings where glucose or some other carbohydrate was used for food since all fasters appear to object to such form of diet, preferring actual fasting. We no longer give glucose into the vein since we find that patients absorb it very well through the bowel.

TREATMENT OF EXTRA-UTERINE PREGNANCY AFTER THE FIFTH MONTH

ALFRED C. BECK, M.D.
BROOKLYN

The incentive for this study was a case of full term extra-uterine pregnancy which I had the good fortune to treat in the Long Island College Hospital last fall:

Mrs. C. C., aged 32, primipara, married nine years, menstruated regularly every twenty-eight days. Her last menstruation began Jan. 18, 1918, and continued for three days. No bloody vaginal discharge was noticed at any time during the pregnancy prior to the day before admission to the hospital. In the second month, the patient suffered from pain in the right lower quadrant of the abdomen. Occasionally, this was severe enough to necessitate her remaining in bed, but at no time required the services of her physician. After about two weeks, the pain disappeared, and she resumed her usual household duties. No further symptoms were observed until the last month, when the fetal movements became very active and painful. Oct. 4, 1918, intermittent pains and a bloody vaginal discharge led the patient to believe that she was in labor, and a midwife was called. After two days of suffering, the patient was brought to the hospital. On admission, examination revealed a marked distention of the abdomen. The fetal head was felt very close to the examining fingers in the left lower quadrant. Neither contractions nor the round ligaments could be palpated. Percussion revealed an irregular area of tympany, which extended from the ensiform to slightly below the umbilicus. The fetal heart was heard on the right side below the umbilicus. From these atypical abdominal findings, the fetus was thought to be free in the abdomen.

Because of the extreme distension, it was deemed advisable to postpone operation until after an attempt was made to relieve this complication, as the patient was otherwise in good condition. Gastric lavage and colonic irrigations were used to good advantage, and on the following morning, Oct. 8, 1918, the patient was prepared for a laparotomy.

Vaginal examination under anesthesia disclosed a soft thick cervix, which admitted two fingers easily. The uterus was distinctly felt on the right side and was about the size of a four months' pregnancy. Digital exploration of its cavity

revealed it to be empty, and the walls were found to be free from rupture.

The abdomen was opened through a midline incision which extended from the symphysis to the umbilicus. After the sac had been incised, a well developed child was extracted. The placenta was found to be widely attached to the right broad ligament and sigmoid and extended anteriorly along the parietal peritoneum almost to the midline. By the use of clamps and ligatures the placenta was removed. A vigorous hemorrhage now took place from the friable areas through which some of the ligatures had torn. Pressure was made over the abdominal aorta, thus partially arresting the flow of blood, while the bleeding points were secured with three clamps. These were surrounded by a Mikulicz drain, and the wound was closed, except in its lower angle, through which the drain and clamps protruded. The patient was returned to her bed in good condition. The duration of the operation was forty minutes.

The clamps were removed on the third day, and the drain was started on the following morning. The temperature rose to 100.6 on the second day following the operation, after which it remained below 100 until October 20, when the wound suppurated. A febrile convalescence continued for twenty-four days, during which the highest temperature was 102.4. The patient was allowed out of bed, Nov. 23, 1918, and was discharged from the hospital in good condition three weeks later.

She has returned several times during the past five months to the post partum clinic, where examinations have shown a complete recovery.

The child was 50 cm. long and weighted 3,450 gm. at birth. No malformations were noted. It was placed under the supervision of Dr. Watton of the department of pediatrics, who recommended artificial feeding because of the mother's condition. On the eighth day, suppurative parotitis developed. Following recovery from this condition, the child did well and weighed 15 pounds and 10 ounces when last seen, June 10, 1919.

RECORDS OF TWO HUNDRED AND SIXTY-TWO CASES

The treatment of this condition must be learned from a statistical analysis of the results in a large series of cases, since the experience of individual operators is so limited that their conclusions are less satisfactory than the deductions which one might make from a collective study of the cases reported in the literature. A careful search of the literature, as well as replies to a questionnaire which was sent to over 200 obstetricians,

revealed only 262 cases of extra-uterine pregnancy between the years 1809 and 1919 in which operations were performed after the fifth month, with a living fetus.

MATERNAL MORTALITY

Table 1 shows the maternal mortality following operative treatment.

TABLE 1.—MATERNAL MORTALITY

Period	Cases, No.	Deaths, No.	Mortality, per Cent.
A. 1809 to 1890	50	34	68.0
B. 1890 to 1900	99	35	35.3
C. 1900 to 1910	91	20	21.9
D. 1910 to 1919	22	4	18.1
E. 1809 to 1919	262	94	35.8

A. Prior to 1890, that is, before the days of asepsis, fifty patients were operated on for this condition, and thirty-four died, a mortality of 68 per cent.

B. During the following ten years, 35.3 per cent. of the patients died. As suggested by Harris, this improvement probably was due to the influence of the teaching of asepsis.

C. The mortality was further lowered in the succeeding ten years to 21.9 per cent. of ninety-one cases, as a result of the advances made in the technic of abdominal surgery.

D. Only twenty-two case reports were found in the literature of the past nine years, owing to the fact that the war greatly interfered with the collection of medical data. Of these twenty-two patients, four died, a mortality of 18.1 per cent.

E. The mortality for the entire series of 262 cases was 35.8 per cent.

OPERATIVE TREATMENT

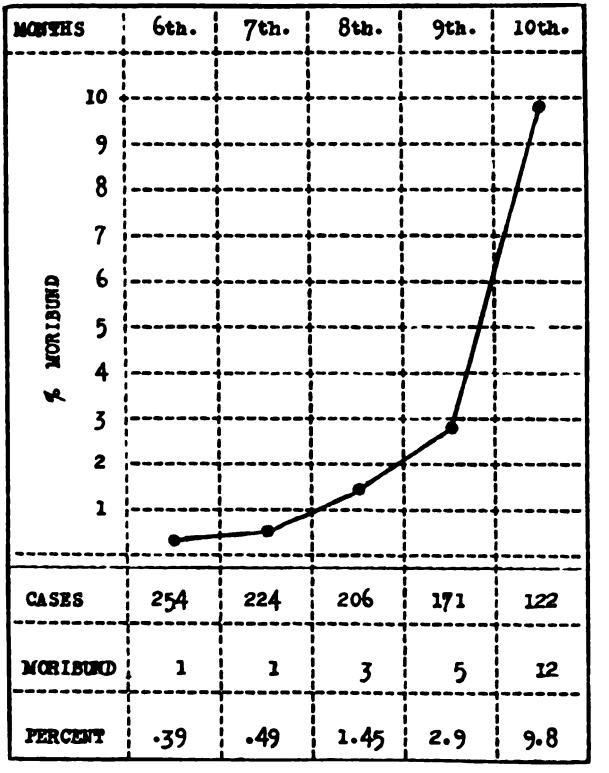
In spite of this high death rate (35.8 per cent.), the treatment of advanced extra-uterine pregnancy always should be operative, as noninterference gives even worse results.

Time to Operate.—Our decision as to the proper time to operate depends on three factors:

1. The danger to the mother of waiting for a viable child.
2. The operative risk at various periods of gestation.
3. The best time to interfere in the interest of the child.

DANGER TO THE MOTHER OF WAITING FOR A VIABLE CHILD

The danger to the mother of waiting for a viable child is shown in Chart 1. From a period of relative quiescence during the sixth and seventh months, the maternal risk gradually but slightly increases in the



CASES	254	224	206	171	122
MORIBUND	1	1	3	5	12
PERCENT	.39	.49	1.45	2.9	9.8

Chart 1.—Cases in which patients were moribund at the time of operation.

eighth and ninth, to become a prominent factor in the tenth month. Twelve of the 122 patients who reached the last month were moribund before the operation was performed. Of these moribund cases, only two were noted during the first two weeks of this five-month period, while ten occurred during the

thirty-ninth and the fortieth weeks. Were this growing danger in the late stage of pregnancy the only factor to be considered in determining the time to operate, we might conclude that:

1. The best time to operate is during the sixth or the seventh month.
2. The added risk in waiting for a well developed child is slight up to the thirty-ninth week.
3. The danger of a catastrophe is sufficiently great in the last two weeks to warrant interference before this period is reached.

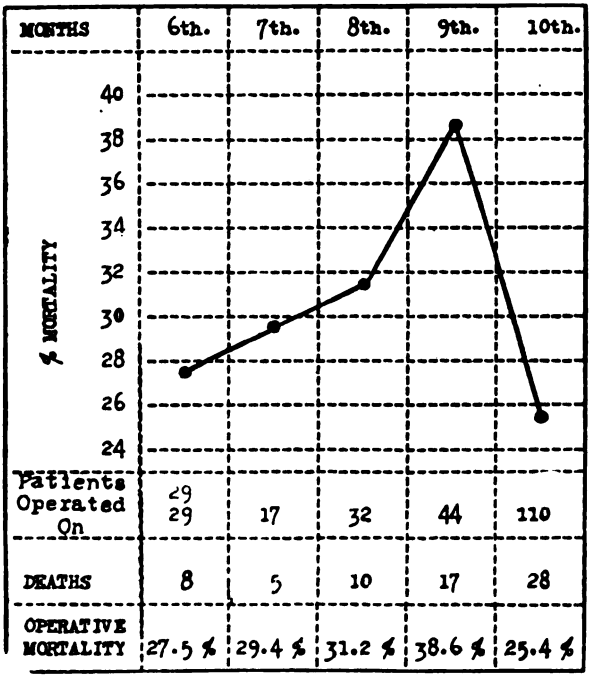


Chart 2.—Operative mortality at different periods of gestation.

OPERATIVE RISK AT THE VARIOUS PERIODS OF GESTATION

The operative risk at the various periods of gestation is shown in Chart 2. The danger from the operation itself increases as pregnancy advances, until the last month is reached, when it is less than at any

previous time. An analysis of all of the deaths shows the apparent reason for this diminished risk during the tenth month to be a lessened tendency toward hemorrhage at that time. After the thirty-eighth week, 36.8 per cent. of the deaths were due to hemorrhage, while almost twice as large a proportion, 65.3 per cent., resulted from this cause when the operation was performed before the last two weeks.

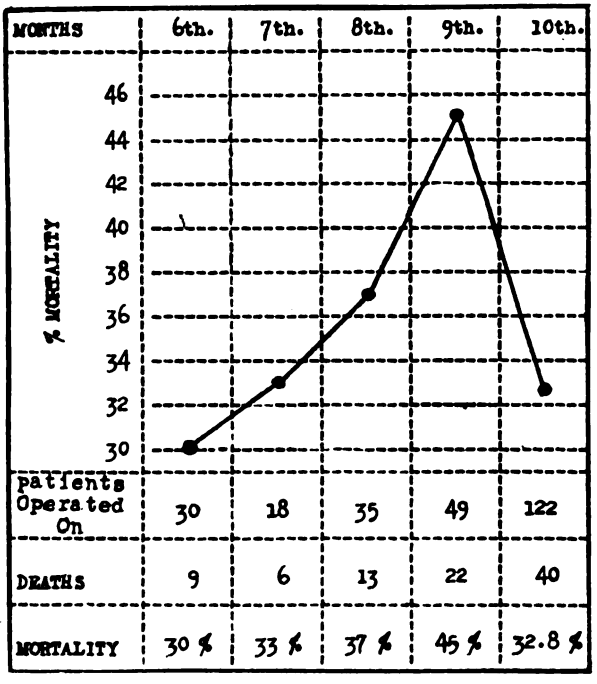


Chart 3.—Mortality at different periods of gestation.

By adding the moribund cases in Chart 1 to the operative deaths in Chart 2, the maternal mortality is found to be 30 per cent. for the sixth month, 33 per cent. for the seventh, 37 per cent. for the eighth, 45 per cent. for the ninth and 32.8 per cent. for the tenth. Chart 3 is a graphic representation of these figures,

and illustrates the fact that, even though almost 10 per cent. of the patients operated on during the last month were moribund before the operation, the gross maternal mortality for the tenth month is almost as low as in the sixth, and lower than in the intervening months.

BEST TIME TO INTERFERE IN THE INTEREST OF THE CHILD

The most suitable period for intervention in the interest of the child is shown in Table 2, which gives the duration of life of the infants born at different

TABLE 2.—INFANT MORTALITY *

Period of Gestation, Weeks	Time of Infants' Survival: 1 day	2 days	1 Week	2 Weeks	3 Weeks	1 Month	1 Year	Time Unknown
40	31	2	2	3	2	10	25	10
39	2	..	..	..	..	2	1	..
38	2	4	..	..	1	4	12	..
37	4	1	..	..	..	1	2	1
36	12	..	..	1	1	10	5	3
35	6	..	..	..	..	1	..	..
34	1	..	1	..	..	1	..	1
33	3	..	..	..	1	1	1	..
32	9	1	..	..	1	1	..	..
31	2	..	..	..	..	..	..	..
30	17	1	..	..	..	1	2	..
29	2	..	..	..	..	..	..	..
28	5	1	..	..	1	..	..	..
20 to 27 incl.	37	1	..	..	..	..	..	1
Unknown	2	..	1	..	2	..	1	2
	135	11	4	4	9	32	49	18

* In 202 cases, in which the period of gestation was from twenty-eight to forty weeks, eighty infants survived one month, 39.6 per cent. In eighty cases, in which the period was from thirty-nine to forty weeks, thirty-eight infants survived one month, 47.5 per cent. In 140 cases, in which the period was from thirty-six to forty weeks, seventy-two infants survived one month, 51.4 per cent. In sixty cases, in which the period was from thirty-six to thirty-eight weeks, thirty-four infants survived one month, 56.6 per cent.

periods. These figures are very conservative, as many of the children reported as living at the end of from two to four weeks undoubtedly lived longer. Since 56.6 per cent. of the sixty infants born at from thirty-six to thirty-eight weeks survived one month, while only 47.5 per cent. of the eighty born in the thirty-ninth and fortieth weeks lived the same length of time, it would seem that the safest time to operate in the interest of the child is in the thirty-eighth week.

If the series of cases is sufficiently large to permit us to draw conclusions we may infer that:

1. The best time to operate is in the thirty-eighth week.
2. We are justified in waiting for this period of election, provided the patient is kept under observation.
3. This plan will best conserve the interests of both mother and child.

OPERATIVE TECHNIC

The difficulties which one meets in operating in these cases are usually encountered in the handling of the placenta. Its removal frequently has resulted in uncontrollable hemorrhage. The opposite procedure, its retention within the abdomen, is said to have been responsible for many cases of fatal sepsis. Table 3

TABLE 3.—A COMPARISON OF THE MORTALITY IN THOSE CASES IN WHICH THE PLACENTA WAS REMOVED WITH THAT IN CASES IN WHICH IT WAS LEFT

		Placenta Removed			Placenta Left		
	Period	Cases, No.	Deaths, No.	Mortality, per Cent.	Cases, No.	Deaths, No.	Mortality, per Cent.
A.	1809 to 1890	15	4	26.6	33	28	84.0
B.	1890 to 1900	60	17	28.3	38	17	47.7
C.	1900 to 1910	66	11	16.6	23	8	34.7
D.	1910 to 1919	18	2	11.1	4	2	50.0
E.	1809 to 1919	159	34	21.3	98	55	56.7

gives a comparison of the results obtained by each method.

Before asepsis was generally practiced, the customary routine was to leave the placenta and drain until it came away. Since 1890, most operators have preferred its removal whenever possible. The more frequent use of the latter plan has led to marked improvements in its technic and a consequent progressive diminution in the mortality, while little change has been noted in the results following marsupialization. When the placenta was left, the usual practice was to suture the sac to the abdominal wound and drain until its contents came away. These patients frequently became infected, and many died of sepsis. As the removal of the placenta is impossible in some

instances, our results might be bettered if we used the modern surgical principle of avoiding drainage in these cases. We leave blood clots and placental tissue in the abdomen without drainage when we operate on earlier extra-uterine pregnancies. Would it not be well to follow the same routine when it is impossible to remove the placenta in the advanced cases?

With this suggestion in mind, I placed three fifths of a 500-gram placenta, removed by cesarean section, in the abdomen of a dog. The animal promptly recovered. Two months later its abdomen was reopened, and no trace of the placenta could be found. Absorption takes place under similar conditions in the human being, as has been demonstrated by eight of the cases included in this analysis. The placenta was left to be absorbed in the abdomen in twelve patients. Four of these died, a mortality of 33.3 per cent. In two of the fatal cases, death occurred from sepsis on the second and fourth days and, in all probability, was independent of the method of handling the placenta. These results compare very favorably with the 38.7 per cent. mortality which followed the use of drainage.

The mortality following the removal of the placenta, as well as that which accompanies its retention with and without drainage, is shown in Table 4. While

TABLE 4.—OPERATIVE MORTALITY OF THE DIFFERENT PROCEDURES IN CASES OF EXTRA-UTERINE PREGNANCY FROM 1890 TO 1919

Procedure Employed	Cases, No.	Deaths, No.	Mortality, Per Cent.
Placenta removed	137	23	16.7
Placenta left to be absorbed	12	4	33.3
Placenta left (wound drained) until it came away	52	22	38.7

these figures are somewhat deceptive, in that the placenta was left in the most difficult cases, they are sufficiently trustworthy to justify the statement that it should be removed whenever possible, and that when its retention is necessary, drainage should be avoided except in the presence of hemorrhage or infection.

Many of the fatalities recorded in this series were due to the fact that the operators had no definite plan of treating the placenta other than the idea that it should be removed. Usually the child was quickly extracted, and the removal of the placenta immediately attempted. Not infrequently an alarming hemorrhage necessitated the abandonment of all desire to remove this troublesome structure, and tampons were employed to stop the bleeding, the surgeon considering himself fortunate if the patient was alive at the end of the operation. As no one method is satisfactory for all cases, the surgeon should be familiar with the indications for, and contraindications to, each of the foregoing procedures. If a careful exploration is made before attempting any one of them, the most suitable plan for each case will be adopted before it has been made hopeless by the use of a faulty routine.

OUTLINE OF AN OPERATIVE ROUTINE

The following outline of an operative routine has been suggested by the study of these cases:

1. There should be a preliminary preparation for the control of hemorrhage and the treatment of the acute anemia which may follow. This should include sequestration of the extremities, to permit of autotransfusion. A donor whose blood has been previously tested should be at hand. An asssitant should be instructed in the technic of controlling hemorrhage by compression of the abdominal aorta.

2. On opening the abdomen, care should be used to avoid incising the placenta, as hemorrhage from this source may prove troublesome during the operation and, in those cases in which the placenta must be left, may necessitate the use of a tampon.

3. If possible, a careful exploration of the abdomen should be made before the sac is incised.

4. The extraction of the child should be as gentle as possible to avoid disturbance of the placental insertion.

5. As the handling of the placenta is the most formidable part of the operation, a second careful exploration should be made, if necessary, before deciding on the procedure to be employed.

6. Since the usual mechanism of controlling hemorrhage from the placental site is not followed when the pregnancy

is extra-uterine, the vessels supplying this region should be ligated before the placenta is disturbed. Whenever this blood supply is accessible, the placenta should be removed.

7. The conditions which favor the removal of the placenta are:

(*a*) Its attachment by a pedicle which can be ligated.

(*b*) Easy exposure of the ovarian and uterine extremities of its blood supply.

(*c*) Easy exposure of the ovarian extremity of its blood supply on the side involved, and sufficient accessibility of the uterus to permit of hysterectomy from the opposite side, thus effecting a ligation of the uterine end of the placental supply.

8. After the removal of the placenta, the abdomen should be closed without drainage.

9. If the insertion of the placenta is such that preliminary control of its blood supply is impossible, its removal is contraindicated and great care should be exercised to avoid disturbing its attachment.

10. Under such circumstances, two plans of treatment are available:

(*a*) Closure of the abdomen without drainage, leaving the placenta to be absorbed.

(*b*) Drainage by the use of a Mikulicz tampon, after having sutured the sac to the margin of the wound.

11. The first of these procedures deserves employment whenever the preceding manipulations have not caused hemorrhage, and when infection is not present.

12. If the placenta is cut as the abdomen is entered, the hemorrhage may be arrested by the use of clamps and mass ligation of the cut surface, thus permitting its retention without drainage.

13. The retained placenta ultimately will be absorbed. While waiting for absorption there is a slight risk of secondary hemorrhage and infection from the adjacent intestines.

14. These complications will necessitate a second operation. Should suppuration take place, drainage may be obtained through the vagina.

15. The second method, marsupialization, is applicable to those cases in which the removal of the placenta is contraindicated and the presence of infection or hemorrhage from the placental site necessitates the use of a tampon.

16. The continuous use of drainage predisposes to peritonitis, from which a rather large percentage of patients died in former times, when this procedure was the one of choice.

CONCLUSIONS

1. Because of the high mortality connected with advanced extra-uterine pregnancy and the infrequent occurrence of this condition, every case should be reported.

2. The relatively large number of children that survived operation does not justify a disregard of the interests of the child.

3. The actual operative risk is less during the last month than at any other time.

4. There is very little added risk in delaying the operation until the thirty-eighth week if the patient is kept under observation.

5. Interference at the thirty-eighth week offers the best opportunity for the survival of the child.

6. Preliminary preparation for the treatment of hemorrhage should precede operation.

7. Before attacking the placenta, a careful exploration should be made to determine the proper procedure to be employed.

8. Removal of the placenta gives the best results.

9. The conditions which favor removal of the placenta are:

(*a*) Its attachment by a pedicle which can be ligated.

(*b*) Easy exposure of the ovarian and uterine extremities of its blood supply.

(*c*) Easy exposure of the ovarian extremity of its blood supply on the side involved, and sufficient accessibility of the uterus to permit of hysterectomy from the opposite side, thus effecting a ligation of the uterine end of the placental supply.

10. Preliminary ligation of the vessels supplying the placental site should precede all attempts at removal.

11. When preliminary control of these vessels is impossible, the placenta should be left in the abdomen.

12. Closure of the abdomen without drainage is indicated when hemorrhage and infection are absent, even though the placenta is not removed.

13. The retained placenta will ultimately be absorbed.

14. A slight danger of secondary hemorrhage exists, and infection from the adjacent intestines may occasionally occur before absorption is complete.

15. These complications will necessitate a second operation. If suppuration takes place, drainage may be obtained through the vagina.

16. Marsupialization should be limited to those cases in which the removal of the placenta is contraindicated and the presence of infection requires drainage, or in which hemorrhage necessitates the use of a tampon.

17. The continuous use of drainage invites infection in these cases, as is shown by the results obtained when this procedure was the one of choice.

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TRENDELENBURG ANESTHESIA IN SURGERY OF THE PELVIS

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I am convinced that the Trendelenburg[1] method of anesthetizing plays an important rôle in the prevention of postoperative ileus and shock, and therefore believe it worthy of consideration by this section.

It is a well known fact that trauma to the small intestine is one of the direct causes of postoperative shock and ileus. An experienced surgeon can often predict just which patient is going to have a stormy convalescence by the amount of trauma the small intestine has, of necessity, been subjected to during the operation; for trauma to the small intestine differs very much in its harmful effects from trauma to the other intra-abdominal organs. Indeed, some of the most comfortable patients we see after operation are those who have had resections of the large intestine, or extensive operations on the stomach, and some of the sickest are those with the quiet distended abdomens, regurgitation, restlessness and fast pulse-symptoms hard to differentiate from a beginning peritonitis or a mechanical obstruction of the bowels, and which are the result of extensive trauma to the small intestine by the use of packs, made necessary to get exposure of the operative field.

Briefly, the object of the method is to rid the pelvis of as much of the small intestine as possible before the abdomen is opened for an operation in the pelvis.

1. Guthrie, Donald: Factors of Safety in Abdominal Hysterectomy, Am. J. Surg. 33: 49 (April) 1919.

It is best employed for ether anesthesia, although I have used it with a fair degree of success during gas-oxygen anesthesia. The anesthesia is started with the patient in the high Trendelenburg position (Figs. 1 and 2) on the operating table. It is not necessary to have patients who object come into the operating room to be anesthetized, although with the proper kind of anesthetizers very few patients will object. If the anesthetic is given in an anesthetizing room, the patient is put on the table which is to be used during the operation, and the anesthesia is started with the patient in the high Trendelenburg position. The method cannot be employed successfully except by a skilled anesthetist, one who is well trained in suggestion and who can quiet the most apprehensive patient and quickly allay her fears, for the objections to the method are that it may frighten the patient and that the position may be uncomfortable.

It has been asked why it is not possible to begin the anesthesia in the dorsal position and change to the Trendelenburg position as the patient is getting under the anesthetic, or to wait until the patient is fully anesthetized and then change to the Trendelenburg position before making the incision. I have tried both these methods, and in my hands they do not work with the same success as the method I am advocating. To change the patient's position as she is getting under the influence of the anesthetic frightens her, I have found, and starts straining or coughing, either of which is fatal to the success of the method. To wait until the patient is fully anesthetized and then change her position does not give the diaphragm time enough to pull the intestine out of the pelvis.

The anesthetist, who has previously met the patient, accompanies her to the operating room, feeding her mind with well chosen suggestion. The patient steps on a stool and sits on the table, the foot part of which has been lowered. The legs are fastened to the foot

Fig. 1.—Patient's legs strapped to foot of table by a broad surcingle.

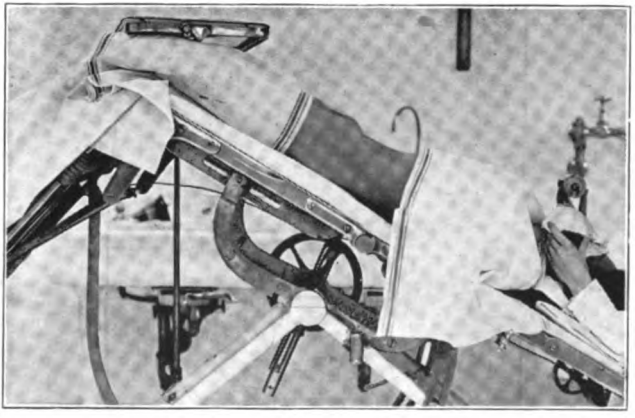

Fig. 2.—Anesthesia begun with patient in high Trendelenburg position.

Fig. 3.—Lifting abdominal wall to free pelvis of any coil of small intestine.

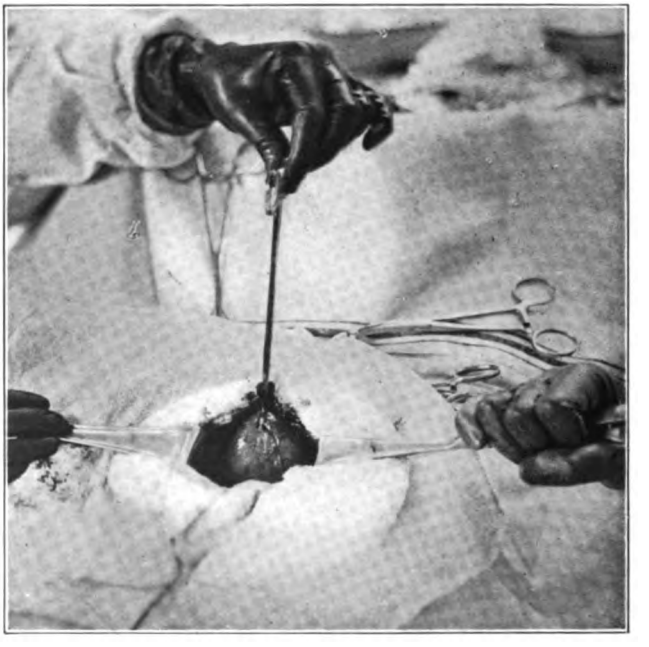

Fig. 4.—Exposure of pelvis, only one small square of gauze being necessary.

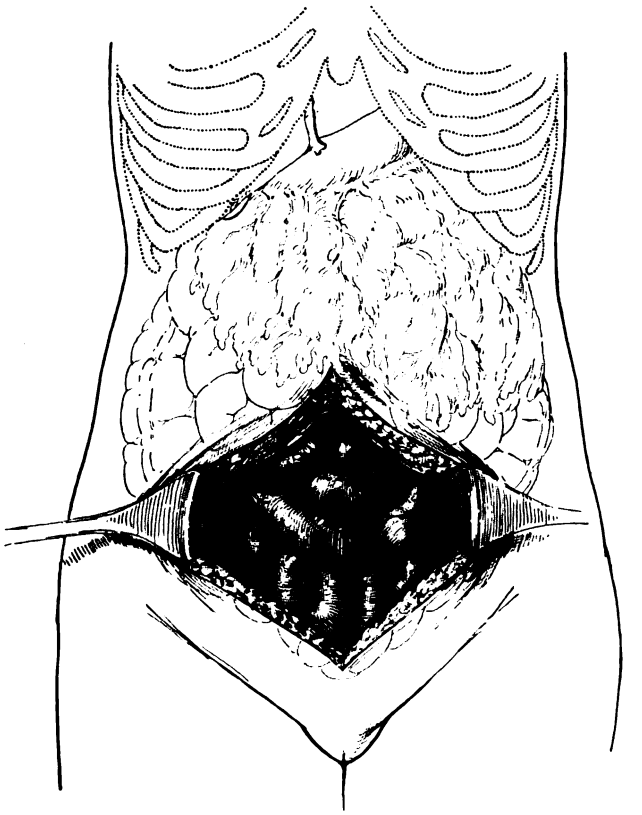

Fig. 5.—Compare difference in amount of small intestine in pelvis when patient is anesthetized in the dorsal position.

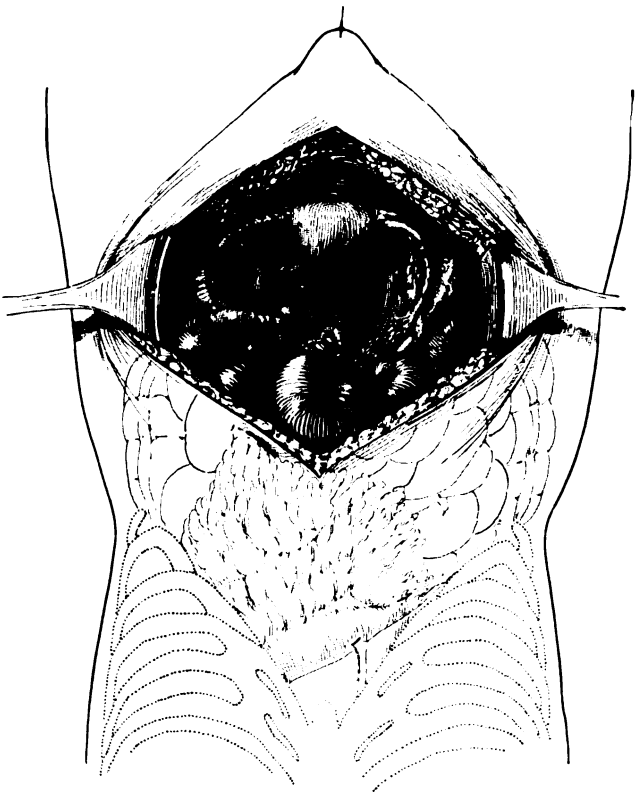

Fig. 6.—Trendelenburg anesthesia: coils of small intestine gravitated out of pelvis when patient is anesthetized in this position.

of the table by a broad surcingle which is fitted snugly, but not made uncomfortably tight (Fig. 1). The patient then lies down on the table with her hands clasped and her arms folded across her chest. The arms are fastened by a gauze bandage, which is attached to the head of the table. The table is now lowered in the high Trendelenburg position and the anesthesia begun (Fig. 2). Absolute quiet is maintained in the operating room while the anesthetic is given. The patient's attention is left entirely with the anesthetist.

If the anesthetic has been given successfully and the patient has not strained or coughed while going to sleep, it is usual to find only a coil or two of small intestine in the pelvis, provided, of course, the intestine is not adherent to the pelvic structures. Through a small opening in the peritoneum, two fingers of the right hand are inserted into the cavity, and the abdominal walls are well lifted up (Fig. 3). The inrushing air will cause any coils of intestine which have not gravitated out of the pelvis to slide upward, so that it is usually necessary to employ only one small gauze square to get excellent exposure (Fig. 4).

In comparing this method with the one usually employed, that of anesthetizing the patient in the dorsal position, making the incision and then calling for the Trendelenburg position (Fig. 5), it is amazing to see the difference in the amount of gauze packing necessary to use to obtain exposure (Fig. 6).

ABSTRACT OF DISCUSSION

Dr. John Osborn Polak, New York: It is a privilege to endorse what Dr. Guthrie said of the advantages of etherization in the extreme Trendelenburg posture as suggested by him. Those of us who have seen the foreign operators have been impressed with the facility with which they operate on the pelvic organs. The two points which make operation on the pelvic organs easy are, first, proper exposure of the pelvis by posture and, second, sufficient exposure of the field by a large incision. Whether these pads be the gauze roll, or

whether they be individual pads, or whether they be protected with guttapercha tissue as suggested by some, they all produce trauma. If any of you have taken the trouble to investigate the experimental use of gauze on the peritoneum of animals you will know this to be true. What Dr. Guthrie said is absolutely true, that the postoperative convalescence is dependent on the amount of trauma done to the small intestine. The usual transfer of the patient from the anesthetizing carriage to the operating table is not only an unnecessary waste of ether, for it disturbs the patient who is awakened from her light anesthesia and we have greater difficulty in securing sufficient relaxation. Consequently the operating table should be mounted with large wheels so that the patient may be anesthetized in this position on the table for pelvic operations. There is one criticism that I would make; I do not know that I have any ground for it. Instead of flexing the legs on the thigh and maintaining the patient in position by fastening the legs to the table which we feel causes tension of the rectus muscles and require deeper anesthesia, we have been having the legs extended and the weight of the body supported by the shoulders which are held in place by well padded shoulder pieces. When the patient is in this Trendelenburg posture I do not believe this posture can be used from the beginning as satisfactorily with the combination gas oxygen as with ether. The nitrous oxid-oxygen men tell us that they have educated the surgeon to operate with tense muscles. We feel that in operating we can get the needed amount of relaxation with minimum anesthesia if the patient is not disturbed during the induction of the anesthesia and this posture is used from the beginning of the anesthesia.

Dr. Albert J. Ochsner, Chicago: As to the time at which the foot of the bed is to be elevated, I would say that it does not matter so much so long as the table is elevated several minutes before the operation is begun. Bell of Montreal directed attention to the fact that when he anesthetized patients in the moderate Trendelenburg posture they did not inspire any mucus, and consequently at that time when most surgeons had many cases of ether pneumonia he had none. Of course, the inspiration of mucus does not begin until the patient is fairly well anesthetized because the patient protects herself before that time by swallowing the mucus, so that this feature will be equally well taken care of if the patient is completely anesthetized in the horizontal position, and then before the ultimate preparations are made for the operation the foot of the bed is elevated, but you can tell the difference every time in the position of the intestines in patients remaining in the horizontal position until the abdomen is opened. For twenty years I have invariably directed that the foot of the bed be elevated

when the operating table is wheeled into the operating room. We have an anesthetizing room and then wheel the patient into the operating room and then the foot of the bed is immediately elevated. I am absolutely sure that Dr. Guthrie's plan is of tremendous value.

DR. DONALD C. BALFOUR, Rochester, Minn.: Dr. Guthrie had brought out a point in operative procedure that can well be kept in mind at all times. We follow out practically the same practice. We make the time a little later in which the patient is put in the Trendelenberg position, that is, as soon as the patient is unconscious of what is going on. In the majority of cases there is then sufficient time for the pelvis to be practically clear of small intestine. In my own observation much trauma is occasionally caused because of the impatience of the surgeon. Instead of being willing to wait until the patient is well relaxed and the intestines can easily be blocked off from the pelvis by gauze, their impatience is so great that while the patient is straining they try to force the intestines into the abdominal cavity rather than waiting for good relaxation.

DR. DONALD GUTHRIE, Sayre, Pa.: I would like to emphasize two points. First, the method of lifting the abdominal walls up after the peritoneum is opened. Any coils of intestine that have not gravitated out of the pelvis during the anesthesia can, as a rule, be made to slide upward. Second, I believe that we can get better results in fully anesthetizing patients in the Trendelenburg posture rather than to anesthetize them in the dorsal position and then change to the Trendelenburg position before the abdomen is opened, as mentioned by Dr. Balfour. This method cannot be employed successfully except by a skilled anesthetist, who is well trained in suggestion.

ABDOMINAL SURGERY UNDER LOCAL ANESTHESIA

ROBERT EMMETT FARR, M.D.
MINNEAPOLIS

The literature on local anesthesia deals so uniformly with arguments regarding the merits of local as compared with general anesthesia that one hesitates to bring up for discussion that phase of the subject. The personal equation, however, enters so largely into the question that the advantage of one over the other, aside from the element of safety, will depend to a great extent on the experience of the operator. Those who are for any reason unable successfully to perform a large variety of operations under local anesthesia are at once a unit in deciding that general anesthesia has more advantages. On the other hand, those who can with satisfaction perform a large variety of operations by the local method will be found to hold the opposite view. It must be admitted that at the present time a vast majority of surgeons believe that general anesthesia is the method of choice, and that local anesthesia should be reserved for minor and for extreme cases. That sentiment is undergoing a rapid change in favor of local anesthesia must be admitted also. It is my belief that the opinion of a surgeon regarding the relative merits of the two methods will vary in accordance with his experience, and that the more experience one has with local anesthesia, the more successful he will be with it and the more enthusiastic he will become regarding its use. I believe that local anesthesia represents one of the greatest advances of the time, and that, provided no other method is discovered to supplant general anesthesia, the latter will to a large degree be replaced by the local method.

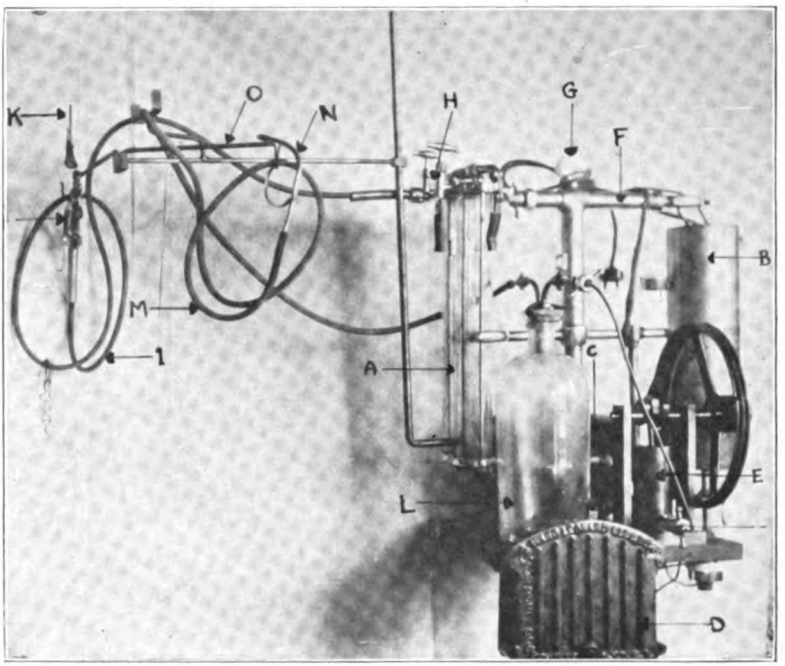

Fig. 1.—Pneumatic injector: *A*, glass cylinders for procain; *B*, pressure tank for compressed air; *C*, motor; *D*, rheostat; *E*, compression pump; *F*, cotton filter; *G*, air gage; *H*, valves; *I*, flexible metal tubing; *J*, cutoff; *K*, needle; *L*, suction bottle; *M*, rubber tubing for suction; *N*, suction tip; *O*, towel rack.

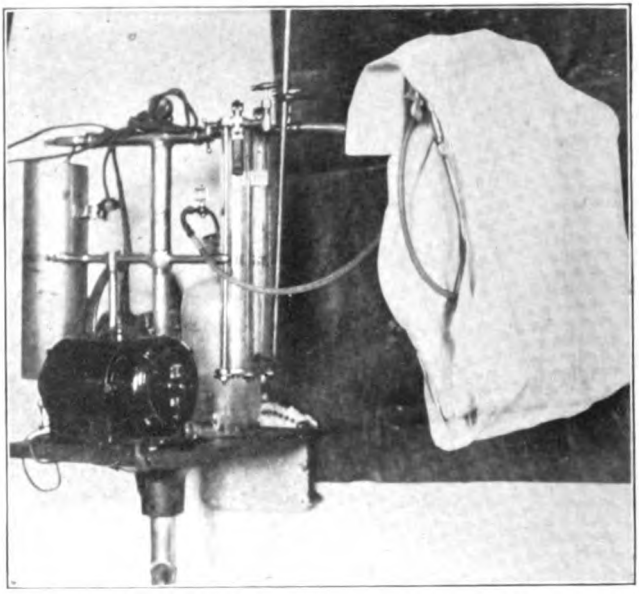

Fig. 2.—Pneumatic injector, "set up," filled and ready for use. Note sterile towel, protecting tubing. By turning down the upper end of this towel we develop the diaphragm shown in Figure 4.

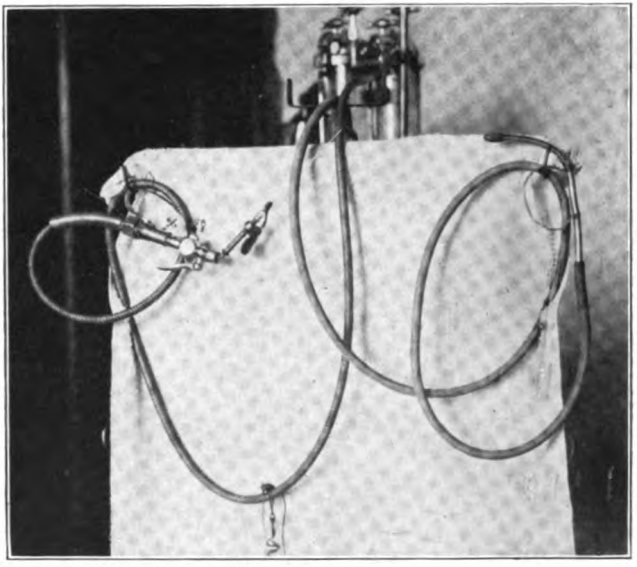

Fig. 3.—Pneumatic injector, cutoff and suction tubing within easy reach of surgeon's hand, and separated from the injector and anesthetist by sterile towel.

Fig. 4.—Apparatus in use: Abdominal tumor delivered. Relative positions of anesthetist, patient, surgeon, pressure and suction tubing, with sterile towel as diaphragm definitely isolating the operative field. Injector is to the right, outside the field of the illustration.

ADVANTAGES OF LOCAL ANESTHESIA

I shall enumerate some of the advantages of local over general anesthesia, and reserve the balance of the time allotted me for a consideration of the methods which, in our hands, have given satisfaction.

First of all, the one great advantage of local over general anesthesia is that of safety. That procain is safer than any of the general anesthetics is, I believe, admitted by all. The other main points to be considered relate to the comfort of the patient and the efficiency of the anesthesia. There is some question as to which of these two points should be considered the more important. While the comfort of the patient is an extremely important matter, I consider the manner of performing the operation of even greater consequence. I wish, therefore, to call attention to some significant factors relating to the efficiency of an operation performed under local as compared with one performed under general anesthesia.

In all operations one is confronted with the consideration of such factors as hemorrhage, sepsis, trauma, exposure, time and shock. These factors are not necessarily mentioned in the order of their importance; as a matter of fact, their relative importance varies in different operations. I wish briefly to consider each one of these factors in relation to these two methods of anesthesia.

Hemorrhage.—It is pretty definitely established that shock bears a direct relation to the amount of blood lost during an operation. In local anesthesia, the use of epinephrin and the possibility of doing more deliberate work give one a control over the blood supply that is superior to that offered under general anasthesia. Another factor which is not fully appreciated by those who do not do a fairly large amount of local work is the turgescence of the vessels, especially in the venous system, when general anesthesia is used. This is especially noticeable in work about the neck and

head, and is also markedly apparent in abdominal work. The distended and engorged vessels so frequently seen during general anesthesia are uniformly collapsed during local anesthesia.

Sepsis.—The dangers from sepsis probably differ very lightly in the two forms of anesthesia. To my mind, however, what advantage exists is in favor of local anesthesia, for the reason that operations performed under local anesthesia may be done more deliberately and with more attention to detail than is possible when general anesthesia is used. In abdominal work, especially, the excursion of the abdominal viscera with respiration, during general anesthesia, is oftentimes marked, and may cause considerable embarrassment. The placid condition of the viscera under local anesthesia possibly gives one technical advantages. In the case of localized abdominal infections, for instance, it is not uncommon to see a spread of the infection result from the struggles of the patient while going under or emerging from general anesthesia; and I myself have witnessed a number of cases in which localized abscesses had ruptured internally during anesthetization or at operation. On the other hand, with a perfect local anesthesia and careful handling of a patient I have never seen this accident occur. During operation, abdominal packs may be introduced without danger of rupturing an abscess, and after operation the perfect physical rest attained aids in preventing the spread of a septic process. Postoperative vomiting and restlessness undoubtedly interfere with nature's process of localizing abdominal infections.

Trauma.—One of the greatest advances in surgical technic of the last two decades has resulted from the realization that the tissues should be traumatized as little as possible during surgical operations. To local anesthesia, and to those who have employed it, must largely go the credit for this advance. Sepsis and morbidity following operations are closely related to

the degree of trauma inflicted during operation. I am sorry to say that one still sees, all too frequently, a violation of the principle that the tissues should be traumatized as slightly as possible, and in this regard those using local anesthesia are not the offenders, but are, as a class, leaders in teaching the necessity of delicate handling of the tissues.

Exposure.—When one observes the exposure that may be obtained in abdominal work under a good infiltration anesthesia, resulting in a negative intra-abdominal pressure, with the viscera retracting from the laparotomy wound instead of extruding through it; when one sees organs lying in their natural position, devoid of engorgement and motion, he must at once realize that nothing but the most profound general or spinal anesthesia will give as good an opportunity for inspection and operative work in this region. True, the viscera may not be delivered or displaced and handled as readily; distant digital explorations are not so easily made, and adherent masses are not so easily dealt with. If we confine the use of local anesthesia, however, to the class of cases in which it is indicated, and if we agree that, to a large extent, visual rather than digital exploration should be made within the abdominal cavity, local anesthesia compares favorably in offering adequate exposure.

Time.—The element of time quite naturally presents itself along with the other factors. The argument so frequently presented that the excess of time required for local over general anesthesia cannot be spared by the surgeon should, it seems to me, be unworthy of consideration. I wish to consider the element of time only in relation to the patient's welfare. Other things being equal, it will, I think, be admitted that an operation which is done deliberately will receive more attention to detail and be performed with more finesse than when the surgeon is making every effort to finish the operation as quickly as possible. A consideration of

this feature must surely result in findings in favor of local over general anesthesia.

Shock.—Assuming that the amount of hemorrhage and trauma are reduced by the use of local anesthesia, the natural inference would be that there would be less shock following operations performed under local anesthesia. This is undoubtedly true and this fact is, I think, recognized by all. It will take but a small series of major abdominal operations performed under local anesthesia to convince anyone that the condition of the patients following these operations is not to be compared with the condition we are accustomed to see after serious abdominal sections performed under general anesthesia, even though fairly careful technic has been followed in the latter. Three or four of these patients operated on during a morning can be cared for by a student nurse during the rest of the day, while she attends to her other duties, whereas few surgeons would be careless enough to leave any patient who has had general anesthesia without constant attendance on the part of a nurse for a few or perhaps several hours following the operation. The absence of thirst, nausea and vomiting, with their resultant dangers and disagreeableness, the low percentage of gas pains, which occur almost directly in proportion to the amount of trauma inflicted by abdominal packs and handling, are in marked contrast to that which takes place in patients who have been operated on under general anesthesia. I believe that surgeons have become so accustomed to feeling that the patient who must undergo a surgical operation is entitled to twelve, twenty-four or thirty-six hours of "hell" following it, that we do not appreciate the seriousness of the condition. Would it not be a good plan for every surgeon to spend occasionally the following twelve to twenty-four hours in the ward with several of the patients on whom he had operated under general anesthesia during the forenoon? The education obtained would almost equal that acquired by having the method applied to oneself.

The percentage of abdominal operations that may be performed with satisfaction under local anesthesia will, as I have already stated, depend largely on the experience of the operator. I have found that conditions which a few years ago I thought were amenable only to surgery under general anesthesia I now handle with the greatest ease and satisfaction under local anesthesia. The realization of the fact that operations begun under local may be finished under general anesthesia, in case it becomes necessary, has greatly increased the scope of the method. At present we begin all of our abdominal operations, regardless of the age of the patient, under procain anesthesia, and change to general without hesitancy when it is advisable.

A discourse on this subject would be incomplete without a reference to the question of local anesthesia in children. In our experience, abdominal operations may be performed on children with as great facility as on adults, or even greater. We have repeatedly made laparotomies on very young children without signs of distress from the time the abdomen was opened until the closure was made. In two recent cases of hypertrophic pyloric stenosis, in babies under 6 weeks of age, the entire operation was completed without an outcry or expulsive effort on the part of the babies. This operation, which is considered a serious one, is by this method converted into what might be called a minor procedure, which may be carried out with almost ridiculous ease.

TECHNIC

The local anesthetic of choice is procain, 0.5 per cent. in Ringer's solution, combined with epinephrin, 5 drops to the ounce.

In all except hernia cases we depend on a direct infiltration of the abdominal wall rather than on a conduction anesthesia. All layers of the abdominal wall are infiltrated before the incision is made. We

consider the necessity of supplementary injection of procain as an indication that our technic has been faulty.

In making the infiltration, minute attention is given to details. The ideal aimed at is to deposit the fluid equably throughout the desired area without any sensation of pain on the part of the patient after the first needle prick, which is made for the production of the initial intradermal wheal. All subsequent wheals are made from beneath (Fig. 5), and the intradermal

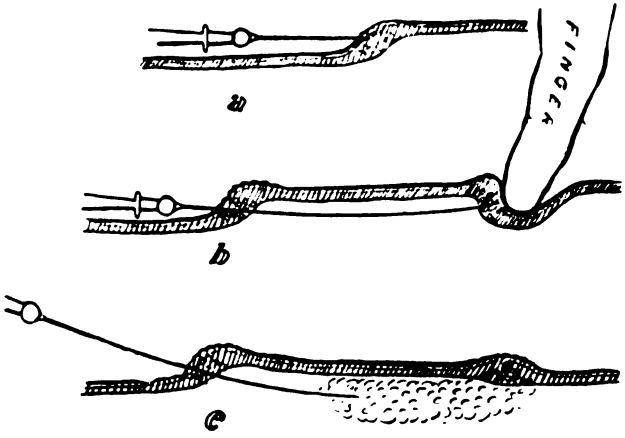

Fig. 5.—Sectional views of the skin: *a*, method of making first dermal wheal; *b*, painless subcutaneous method of making secondary wheals; *c*, method of making subdermal infiltration.

wheal is repeated only for the purpose of secondary introductions of the infiltrating needle as the field is traversed. Aside from the wheal points, the skin is anesthetized by a subdermal infiltration. A 4-inch record needle, No. 23, is used. Through this a wall of infiltration is built beneath the proposed line of incision, with a base from 2 to 3 inches in width, the apex being the line of incision through the skin (Fig. 6).

Equipment.—Ten years ago we discarded the syringe and substituted the pneumatic injector (Figs. 1, 2 and 3) for this work. This apparatus gives

us a constant flow of the solution with a steady pressure controlled by a cutoff, which is ideal from the standpoint of ease of manipulation. With this instrument the ordinary abdominal wall can be anesthetized in from two to three minutes, and, as the incision may be made immediately, much time is saved. The average time, from the beginning of the administration of the anesthetic until the abdomen is opened, is from five to seven minutes. Throughout

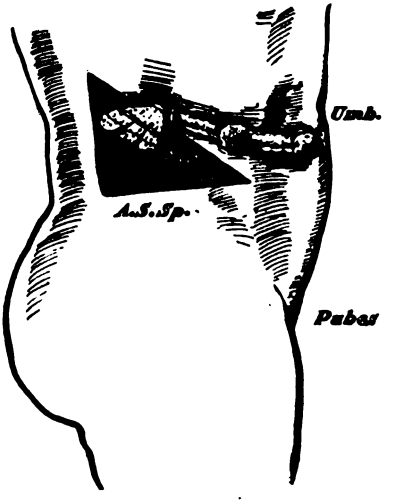

Fig. 6.—Section of abdominal wall, showing area infiltrated.

this procedure every effort is made to eliminate the slightest sensation of pain on the part of the patient. If this is accomplished and the abdominal walls gently retracted vertically, the abdominal viscera will not protrude through the opening but will fall away from the field of operation, and, by making use of the force of gravity, all the viscera in the region of the incision may be examined visually without handling. Per contra, should the injection be carelessly or too rapidly made, or certain sensitive areas be missed in making the infiltration, and the incision thereby cause pain,

there will be established a combative action on the part of the patient, and an expulsive effort which will cause an extrusion of some of the viscera. In the absence of acute infections and marked distention of the intestine, the viscera should not protrude through the abdominal wound in the presence of a perfect local anesthesia, unless, perhaps, the patient should inadvertently cough, sneeze or laugh.

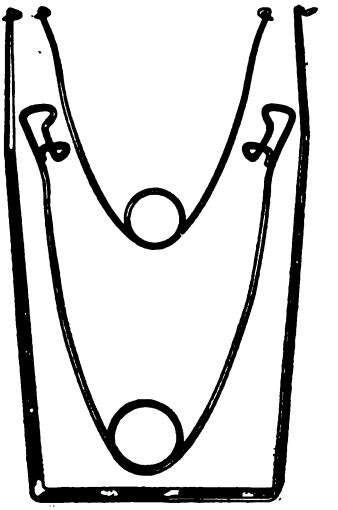

Fig. 7.—Automatic wire retractors.

Retraction of the Abdominal Wall.—Careless or vigorous retraction of the abdominal wall will also produce the expulsive effort which we wish to avoid. With the flaccid abdominal walls usually found under local anesthesia, only the mildest kind of retraction is necessary. I find that the most satisfactory retractor is the wire automatic, which gently and symmetrically spreads the incision (Fig. 7).

Sensitive Areas.—There has been considerable investigation concerning the sensations within the peritoneal cavity. Observations vary in this regard, and different patients seem to vary to some extent. The

areas are more or less constant, however, in response to pain sense. We have found pressure and traction on the round ligaments of the uterus to be painful; and that the ovarian pedicles, the meso-appendix and the region of the cystic duct, are also sensitive. Traction on the mesentery is much more apt to cause nausea than acute pain, and one must be especially careful about making traction on the cecum and duodenum.

SCOPE OF LOCAL ANESTHESIA

Lower Abdomen.—All pelvic conditions of a simple nature may be handled under local anesthesia with great satisfaction. As a certain percentage of pelvic work, however, either is complicated by the sequelae of infectious processes or must be done to eradicate malignant disease, one encounters a fairly large percentage of cases that are difficult to handle under straight infiltration anesthesia.

Caudal Anesthesia.—For a number of years we have been testing a combined caudal anesthesia with an infiltration of the abdominal wall in conditions in which difficult pelvic work is anticipated. The anesthesia acquired in this way is usually ideal, and the complete Wertheim may be performed, or, in fact, any pelvic operation may be readily performed under the combined method.

The administration of procain by the caudal method is simple and is quickly given. In my experience, patients are more apt to show toxic symptoms when this form of anesthesia is employed than if infiltration only is used. A number of patients have shown pallor, increased respiration and pulse rate, faintness and occasional nausea. While we have seen nothing to be alarmed about, I believe that the utmost care should be used in making the injection. It should be made through a flexible needle, which is not liable to break off in the canal, and the injection should be made slowly. A rapid injection will cause pain and is said

to be more apt to cause toxic symptoms. Furthermore, one should avoid making the injection directly into the blood stream.

In the surgery of the bladder, prostate and pelvic organs this anesthesia is ideal, provided it is proved safe.

Above the pelvis we have had little difficulty in making intestinal resections, even with glandular involvement. We have performed several colectomies and colostomies, enterectomies and enterostomies. In the upper abdomen, the stomach, duodenum and gallbladder have most often been dealt with. With an adequate and properly placed incision, visual examination of this important region may be made with entire satisfaction. We have made gastric resections for carcinoma and perforated ulcer, pylorectomies, gastrostomies and gastro-enterostomies under local anesthesia without the patients complaining of pain. Cholecystostomy is an exceedingly simple procedure, in most instances, under local anesthesia. When it comes to the removal of a gallbladder, we have been unable to develop a painless operation. We have, however, accomplished the removal in over 90 per cent. of our cases without resorting to general anesthesia, always allowing the patient the privilege of taking a general anesthetic if the distress becomes too marked. Traction on and clamping of the cystic duct is invariably painful, although in recent cases an infiltration between the gallbladder and the liver and about the cystic duct has rendered the operation almost painless. Work on the common duct will depend entirely on its accessibility. We have removed stones from the common duct and explored this organ numerous times without the least difficulty. Of course, the presence of marked adhesions, with the retraction of the organ up behind the liver, will necessitate general anesthesia.

In gallbladder and duct work it is inadvisable to dislocate the liver, as is recommended for cases under

general anesthesia. Instead of "up-ending" the liver outside of the abdominal cavity, we produce much the same effect by using blunt retractors on the liver edge and "up-ending" it beneath the ribs, thus bringing the gallbladder and ducts into view. During this procedure one pad of gauze holds the stomach and pylorus downward and to the right, while another pad is placed between the gallbladder and the duodenum. With perfect anesthesia, only slight retraction is necessary. If the anesthesia is incomplete, however, and the patient strains, nothing can be accomplished by the method.

One of the most satisfactory conditions to handle under local anesthesia has been extensive adhesions between the viscera or omentum and the abdominal wall. Ample incision and vertical retraction will allow the adherent viscera to hang from the abdominal wall in such a position that the adhesions may be divided on the white or bloodless line, and the most extensive work may be done with slight or no discomfort to the patient.

All plastic surgery on the abdominal wall, with or without adhesions, falls readily into the ideal class for local anesthesia.

One of the disconcerting factors in abdominal work under local anesthesia is the occasional vomiting of the patient. While this accident is generally due to some overt manipulation, it has to be reckoned with, and we have not been able entirely to eliminate it. This emergency has not arisen in more than 5 per cent. of our cases.

OBJECTIONS TO LOCAL ANESTHESIA

The objections to the local method are both real and imaginary. There is undoubtedly a class of cases in which general anesthesia should always be used. There is, I believe, also a class in which local anesthesia should always be used. That the latter class could be greatly increased with an improvement over the results obtained at present in the large clinics I also firmly

believe. The objection that wide explorations cannot be made under local anesthesia is to some extent true, and yet it is to a large degree offset by the fact that wide explorations not made under the direction of the eye seldom give authentic information. How absurd it is, for instance, to see a surgeon extend his gloved hand to the region of the kidney and state that that kidney is normal, and perhaps at the next operation deliver a kidney and spend a considerable time endeavoring to decide whether or not it is normal! Yet we see this absurd procedure carried out daily at many of our best clinics. Of course, a very advanced pathologic condition may be recognized by the introduction of the hand to some distant part of the abdomen; but there are few instances of this kind which cannot be diagnosed before the exploration is made, and, in cases in which the pathologic condition is not advanced, this method of examination is usually unsatisfactory. Furthermore, the introduction of the hand, under local anesthesia, is not an exceedingly painful procedure. With the abdominal wall elevated there is usually room to insert the hand and part of the arm with almost no contact with the surrounding tissues. It is my custom to examine the pelvic organs in gallbladder cases, and vice versa, although, for the reasons already mentioned, I feel that such examinations are possibly overrated with regard to their value.

Working under local anesthesia requires more time, but experience and proper equipment bring this much discussed factor into comparative insignificance. The strain on the surgeon is undoubtedly greater when working under local anesthesia; but if we accept the dictum that the all important factor is the patient's welfare, this objection must be eliminated; and the experience of the surgeon will here, again, make a decided difference. During recent years I find much more comfort in operating on patients under local than under general anesthesia.

CONCLUSION

The use of local anesthesia should no longer be confined to minor surgery and to cases in which the patient apparently cannot undergo the ordeal of taking a general anesthetic.

With proper equipment and technic, a large proportion of major surgery may be done under local anesthesia with greater safety, less trauma, more completeness and less postoperative discomfort than when general anesthesia is employed.

Children lend themselves readily to the method.

The abdominal field presents a most excellent territory for the use of local anesthesia.

ABSTRACT OF DISCUSSION

DR. P. G. SKILLERN, JR., Philadelphia: The pneumatic injector devised by Dr. Farr greatly facilitates and accelerates the establishing of local anesthesia, since it does away with the necessity of picking up and putting down one syringe after another. I have used his apparatus with great satisfaction, and should call this method "operating de luxe." As emphasized and practiced by Dr. Crile, operating under local anesthesia develops a gentleness of touch and technic that is of benefit to the patient. I do not think that local anesthesia has made the progress in surgery it should. Every one ought to be using it today. It is wonderful to be able to operate on these patients, painlessly, without loss of conscience, and have them go back to their room and greet their friends immediately afterward. Surely this is better than the distressing picture we see so often after ether anesthesia, the patient unconscious, tossing about and vomiting in the presence of his anxious relatives and still facing the dangerous after-effects of ether, such as pneumonia, etc. Some claim pneumonia follows the use of local anesthesia, but I have never seen it and cannot figure how it could occur, provided the chest is protected from exposure. The point I wish to bring out very strongly is my belief that local anesthesia should be used—and that nothing else should be used—in a patient suffering from great toxic shock. The illustration, *par excellence,* is acute intestinal obstruction. The high mortality in acute intestinal obstruction is due to the patient already severely shocked from toxins having superimposed on that another toxin in the form of ether. The present high mortality of the acute intestinal obstruction operation will be lowered decidedly if we employ local anesthesia and not ether.

DR. C. N. COWDEN, Nashville, Tenn.: The pendulum is swinging the other way, and the surgeon who is not giving much study to local anesthesia at this time is missing a great opportunity of keeping himself abreast of the times. The postoperative effects of ether are to be remembered forever. It is practically accepted by every one that procain in large dosage is virtually free of toxic effect. One great difficulty is our lack of confidence in our ability to do these operations under local anesthesia. It is difficult to infiltrate a nerve, but we get practically the same effect by infiltration of the area through which the nerves pass. Gentleness in handling tissues, the sharp knife or scissors, lack of blunt dissection are factors which make for the success of operation under local anesthesia. Quinin and urea hydrochlorid has been responsible for some of the unpopularity of the local anesthesia operation, but the disastrous effect of that has now been banished. Operation under local anesthesia is one of the greatest advances made in the last year or two. The automatic injector adds greatly to the success of the method.

DR. J. A. RUBIN, Pittsburgh: Local anesthesia is the coming thing. I have been operating rather extensively under local anesthesia for about six years. Possibly the reason surgeons have failed to develop their local anesthesia technic is the fact that in a great many cases there is sloughing of the wound. Quinin and urea hydrochlorid is very bad for that. Procain alone will not give the desired anesthesia; it must be combined with epinephrin. In operating the field is dry; there is very little bleeding, and the operation is almost like a dissection on a fresh cadaver. By keeping the anesthetized area an inch or more away from the incision we can, in large measure, prevent sloughing or necrosis of tissue.

DR. A. C. SCOTT, Temple, Texas: When one undertakes to explore the abdomen under local anesthesia he can get just so far. The peritoneum cannot be anesthetized throughout. Although you may anesthetize the abdominal wall completely you will not be able to anesthetize the whole abdominal cavity. According to Dr. Farr you should depend more on visual than on digital exploration. This is very good so far as it goes, but it seems to be a confession that the exploration cannot be made completely. I would not feel satisfied to close the abdomen without feeling the gallbladder, kidneys, pancreas and other viscera. You cannot make a satisfactory exploration of the abdomen without using the sense of touch. In anesthetizing the peritoneum near the abdominal incision, one of the best bits of technic is, as soon as a small opening is made through the peritoneum, to slip one finger on the inside of the peritoneum about 2 inches back from the margin of the wound and by placing the hypodermic needle directly through the rectus muscles the point of the needle touches the finger; the opening in the needle is exactly in

the right position to infiltrate the subperitoneal tissue at the site of the most sensitive nerves. By doing that up and down both sides of the incision you secure the best sort of anesthesia of the abdominal peritoneum in the neighborhood of the wound. One part of abdominal work which cannot be done with local anesthesia without pain is in conditions in which you have to make traction on the mesentery. As soon as you pull on the meso-appendix in appendix operations, pain is produced. In ovarian cyst found during pregnancy, when you fear to give a general anesthetic we get magnificent results from local anesthesia. I have used it in diffuse peritonitis where the patient had double pneumonia and yet I did not dare let the peritonitis go without drainage and had equally good results. I have also used it in gastrectomy and conditions of that kind.

DR. ROBERT E. FARR, Minneapolis: I am not much of a golf player and do not believe in making all shots with one stick. However, when I do shoot I generally use my best stick. To my mind, the best stick in anesthesia up to date is local anesthesia, providing it can be used successfully. We see the same difficulty today with local anesthesia that we usually see when a man reads a paper on this subject. He is like the Christian scientists: he will not argue. These papers are discussed by local anesthesia enthusiasts who spend their time picking out a few of the known shortcomings of the method. Dr. Scott says: "You can not explore the abdomen." I say I can. If he cannot, I can not help that. Dr. Ruben says: "We have necrosis of the skin." I say we do not. We never have necrosis of the skin. If we keep the epinephrin below five drops to the ounce and put procain up in Ringer's solution, and make subdermal instead of intradermal infiltration, we do not have necrosis. Local anesthesia should not be blamed for the shortcomings of those who use it. I have been trying to make the use of local anesthesia simple. This can be done by the method I described and by the use of the apparatus shown. If by this method we can get anesthesia in approximately 100 per cent. of cases, why should we introduce double the amount of anesthetic surrounding the field of incision instead of infiltrating directly into it? Nerve blocking has its place and is an excellent method, but it requires an expert to spear for nerves, and this method will never become common. The method should be simple and easy for all to learn. I am not in sympathy with the idea of reserving local anesthesia for extreme cases. If this is a good thing for bad cases it should be a good thing for good cases. I believe that it is a good thing for all cases in which it can be used.

SURGICAL TREATMENT IN THE BLEEDING TYPE OF GASTRIC AND DUODENAL ULCER

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The surgical treatment of uncomplicated benign lesions of the stomach and duodenum has reached a high state of efficiency and standardization. The various complications, however, which may develop in direct connection with gastric and duodenal ulcer, such as acute and chronic perforation, obstruction, deformity, malignant degeneration, and hemorrhage, present added problems to the surgeon; one of the most important of these is hemorrhage.

Gastric hemorrhage has been the occasion of more confusion in diagnosis, uncertainty in therapeutic indications, and irrationality in treatment, both medical and surgical, than perhaps any other gastric condition. The number of cases seen in which an erroneous interpretation of symptoms has led to incorrect suggestion for treatment, resulting in failure to protect the patient against further hemorrhage, illustrates the necessity of persistent study of the subject. This paper is concerned chiefly with two groups of cases, first, those in which operation has proved unsatisfactory because of error in attributing the bleeding to a lesion which is not present, and second, those in which the surgical procedure carried out has failed to obviate further hemorrhages, even though a correct diagnosis has been made.

A study of these groups disclosed certain facts which indicated that it should be possible to decrease the incidence of such failures; in the first group, by

more accurate preoperative diagnosis, with better interpretation of operative findings; in the second group, by the addition of certain specific measures to the standard surgical procedures applicable to benign lesions of stomach and duodenum.

The first group of cases, those in which no intrinsic lesion is present, not only is large but also includes a variety of conditions which may be associated with hematemesis. Some of these conditions do not fall within the field of the surgeon, but there are other conditions which can be eradicated by surgical means, and this group is so important that I shall review briefly a representative example, a case illustrating the diagnostic error of presupposing gastric ulcer because of hematemesis, and of following the error by carrying out a routine operation on the stomach designed to cure this imaginary ulcer:

A man (Case 132411), aged 55, came to the clinic, June 5, 1915, because of recurring hematemesis. In some of the attacks the patient had been almost exsanguinated. The hemorrhages had begun in January, 1914, without a previous history suggestive of a causative factor; in July, 1914, a gastro-enterostomy was performed at his home; he was told that an ulcer was found at the pylorus. Some weeks after the operation a hemorrhage occurred similar to those he had had before the operation, and between that time and his registration in the clinic he had had several distinct gastric hemorrhages, the last severe one occurring in February, 1915. There were no typical symptoms nor physical or laboratory findings to establish a diagnosis, but the patient's condition and history were such as to make further exploration imperative.

In July, 1915, I explored and found a patent and well functioning gastro-enterostomy. Palpation revealed no induration in stomach or duodenum, and no visible signs of ulcer, nor did careful inspection through a large opening in the anterior wall of the stomach show any evidence of an active or healed ulcer at the anastomosis or in the stomach or duodenum. Exploration of the biliary tract disclosed a slight thickening of the walls of the gallbladder through which the yellowish spots on the surface of the mucous membrane which indicate a cholecystitis of the "strawberry" type could clearly be seen. The pancreas, too, showed very distinct changes, being considerably enlarged and nodular. This fact, the gallbladder findings, and past experience in similar cases, seemed

a clue to the cause of the hematemesis. There were no recognizable changes in the liver, and general exploration was negative. A cholecystectomy was performed because in our experience with cholecystitis, with or without stones, associated with pancreatitis, and without jaundice, this has seemed the operation of choice. A well defined chronic catarrhal cholecystitis of the most typical "strawberry" type was found. The patient made an uneventful recovery and has had no hemorrhage since. Similar cases in which the appendix, spleen or liver is the basic focus are not infrequently seen.

The first question, then, to demand a decision in cases of gastric or gastro-intestinal hemorrhage concerns the cause of the hemorrhage. Fortunately, in the majority of cases careful history taking, associated with expert interpretation of roentgen-ray findings, will usually determine whether or not an ulcer is present. If the evidence does not support a diagnosis of ulcer, but indicates disease in some organ in the abdomen, such as the gallbladder, pancreas or appendix, it must not be forgotten that gastric hemorrhage may be due to such extrinsic causes. The spleen and liver particularly should be kept in mind as causative factors, for it has been proved that either the spleen or the liver or both can be the cause of most serious gastro-intestinal bleeding without showing any changes that are recognizable in our present state of knowledge. The group of cases in which an undoubted gastric hemorrhage has occurred but in which the symptoms or physical findings are insufficient to lead to a positive diagnosis either of ulcer or extrinsic trouble requires, therefore, the most serious consideration as to whether operation should be undertaken. Fortunately, symptoms are usually associated with such hematemesis, and, though obscure, justify an exploration, and although doubt may exist as to any satisfactory explanation being found to account for the hematemesis, frequently pathologic conditions extrinsic to the stomach are found which, when eradicated, secure permanent protection against further hemorrhage. In hematemesis unassociated with abdominal symptoms or findings, and in which it is not possible

to establish a diagnosis, operative interference should, as a rule, be advised against.

The group of cases, however, to which I particularly refer is that group in which recurring gastric hemorrhage has been caused by a chronic gastric or duodenal ulcer. Our records show that 25 per cent. of gastric ulcers and 20 per cent. of duodenal ulcers have been complicated by one or more gross hemorrhages. In the earlier days of gastric surgery the operation of gastro-enterostomy proved to be so efficient in a large majority of benign lesions of the stomach and duodenum associated with hemorrhage that the realization came rather slowly that at least some of the failures to obtain a complete cure, including protection against further hemorrhage, could be attributed to the fact that direct attack on the ulcer was not added to the indirect therapeutic measure of gastro-enterostomy. The recognition of the danger of malignant degeneration in gastric ulcer gave the first impetus to the practice of combining gastro-enterostomy with the radical excision or destruction of such ulcers. The advisability of such a principle is now well established.

It has, therefore, become quite evident that in the surgical treatment of a gastric or duodenal ulcer which has been the cause of hemorrhages, some direct attack on the ulcer is most important. The necessity for this has become apparent to us because of the fact that a number of our own patients with duodenal or gastric ulcer had failed to secure, by gastro-enterostomy alone, protection against further bleeding. Apparently rare as such failures were, they nevertheless formed in the aggregate a group which called for an investigation as to the possibilities of reducing the number of such recurrences. A concise compilation of such cases illustrating the incidence of hemorrhage as a late postoperative complication may be found in the accompanying tables. The cases chosen for study were those in which operation was

performed in the Mayo Clinic during the twelve year period between January, 1906, and January, 1918.

A study of Table 1, which represents the percentage of hemorrhages following operations for duodenal ulcer, shows that 12.7 per cent. of the patients who had hemorrhages before operation had hemorrhages after operation, and in two instances the hemorrhages were sufficient to cause death. Twenty patients (0.9 per cent.) in the group who had not reported hemorrhages before operation had hemorrhages following operation. Eighty-three patients, 2.8 per cent. of the total number operated on, had hemorrhages following operation.

TABLE 1.—HEMATEMESIS IN CASES OF DUODENAL ULCER IN WHICH OPERATION WAS DONE

Jan. 1, 1906, to Jan. 1, 1918

	Cases, No.	Per Cent.	Operative Mortality from All Causes Per Cent.
Total number	2,875	....	1.6
Patients having hemorrhage before operation	583	20+	1+
Patients having hemorrhage before operation heard from	494	86.0	...
Patients reporting hemorrhage after operation	63	12.7*	...
Patients reporting hemorrhage after operation but none before	20	0.9	...

* Or 2 per cent. of the total number.

Fifteen patients (8 per cent.) with gastric ulcer report hemorrhage after operation who had had hemorrhage before, and two patients (0.3 per cent.) had hemorrhage who had not had hemorrhage before operation. Seventeen patients, therefore, suffered from hemorrhage after operation, a percentage of 1+ of the total number of gastric ulcers operated on.

A comparison of the figures in Tables 1 and 2 shows that the incidence of hemorrhage in duodenal ulcer following operation is definitely higher than the incidence in gastric ulcer, notwithstanding the fact that there is a greater tendency for gastric ulcer than for

duodenal ulcer to be complicated by bleeding. This important fact, namely, the difference in operative results in gastric and duodenal ulcers, may be largely attributed to essential differences in operative technic.

The radical treatment of gastric ulcer was originally due to the recognition of the fact that an ulcer on the gastric side of the pylorous holds unquestionable possibilities of becoming malignant. Excision of such ulcers either by knife or cautery was, therefore, performed whenever possible by surgeons whose experience was sufficient to make them appreciate the necessity of this treatment. Such radical measures necessarily carry a higher operative mortality, but the avoidance of such mortality by simpler operative measures means a marked increase in ultimate morbidity and mortality.

TABLE 2.—HEMATEMESIS IN CASES OF ULCER OF THE STOMACH IN WHICH OPERATION WAS DONE

	Cases, No.	Per Cent.	Operative Mortality from All Causes Per Cent.
Total number	863	....	3+
Patients having hemorrhage before operation	222	25.8	4.8
Patients having hemorrhage before operation heard from	180	81+	...
Patients reporting hemorrhage after operation	15	8.0*	...
Patients reporting hemorrhage after operation but none before	2	0.3	...

* Or 1+ per cent. of the total number.

In duodenal ulcers, however, radical treatment was not necessary because of this possibility of malignant degeneration or of disabling complications, and the indirect method of treatment by gastro-enterostomy proved to be sufficient in a high percentage of cases to relieve the patient of the symptoms of which he complained. The more frequent occurrence of hemorrhage after operation for duodenal ulcer than for gastric ulcer is apparently due to this difference in operative procedure, and the following facts bear out

such a statement: In not one of the eighty-three cases in which hemorrhages occurred after operation for duodenal ulcer was the combined operation of excision of the ulcer with gastro-enterostomy carried out, and with the exception of eight cases in which various types of pyloroplasties were performed, in every case a gastro-enterostomy alone was performed. This fact is significant particularly when one compares the results of the established methods of excision and gastro-enterostomy in gastric ulcer in which, although the tendency to hemorrhage had been greater, a much smaller percentage of bleeding followed operation. The combined procedure of excision and gastro-enterostomy was carried out in only one of the seventeen cases of gastric ulcers in which there was bleeding after operation. These facts can only mean that the methods of direct attack combined with gastro-enterostomy which are used in the treatment of gastric ulcer are a source of protection to the patient against further hemorrhage.

Another point brought out in the study of these cases is that in the majority of those patients who had bleeding after operation, the operation relieved all other symptoms, so that the recurrence of the complication of hemorrhage was the only feature which marred an otherwise perfect result. This fact is difficult to explain. It raises the question, for example, whether the hemorrhage actually comes from the site of the symptomless ulcer. The fact that the mucous membrane can bleed when no visible lesion is present, and that recurring hemorrhages from the stomach may take place without any demonstrable changes either in the stomach or in any other organ, throws some doubt on the assumption that all such recurrences have their origin at the site of the ulcer. But the fact remains that in the majority of cases in which we have reoperated, radical treatment of the ulcer area obviated further hemorrhages.

Our gradual realization of these facts, particularly when we found that 12 per cent. of duodenal and 8 per cent. of gastric ulcers which had been the source of bleeding before operation bled after operation, led to a thorough search for some means of lowering the incidence of these failures. From a study of our own cases it was perfectly evident that gastro-enterostomy alone, as I have pointed out, is insufficient protection against further hemorrhages, and that excision combined with gastro-enterostomy has given almost total protection. The problem resolves itself, therefore, into one which concerns the safest method of accomplishing a radical excision in the majority of cases. Various suggestions have been made and carried out at different times. Ligation of the vessels in the circumference of the ulcer, a procedure highly recommended by Woolsey,[1] devitalization by constricting suture, pyloric exclusion of von Eiselsberg,[2] and excision have all been tried. Unfortunately, under certain circumstances knife excision is a formidable technical procedure and one at which even the experienced surgeon will wisely hesitate. In a search for some method which will be at the same time radical, safe and applicable in the largest number of cases, we have adopted the actual cautery as meeting these requirements.

TECHNIC

The technic for the use of the cautery in the bleeding type of gastric ulcer differs in no particular from that used in the ulcer which has not been associated with bleeding; it may be briefly described by stating its important features.[3] Probably the most impor-

1. Woolsey, G.: The Surgical Aspects of Gastric Hemorrhage, New York M. J. **107**: 395-398 (March 2) 1918.

2. Von Eiselsberg, F. A.: The Choice of the Method of Operation in the Treatment of Gastric and Duodenal Ulcer, With a Review of My Experience Accumulated in the Past Ten Years, Surg., Gynec. & Obst. **19**: 555-563 (Nov.) 1914.

3. Balfour, D. C.: Cautery Excision of Gastric Ulcer, Ann. Surg. **67**: 725-731 (June) 1918.

tant point in the technic is the exposure of the peritoneal side of the ulcer, and, in a great many instances, as we have recently demonstrated, a close shaving of the gastrohepatic omentum (Fig. 1) with a portion of the thickened peritoneal coat will disclose the minute opening which marks the site of chronic perforation. In many cases a probe may be introduced (Fig. 2) through this tract and used as a guide in introducing

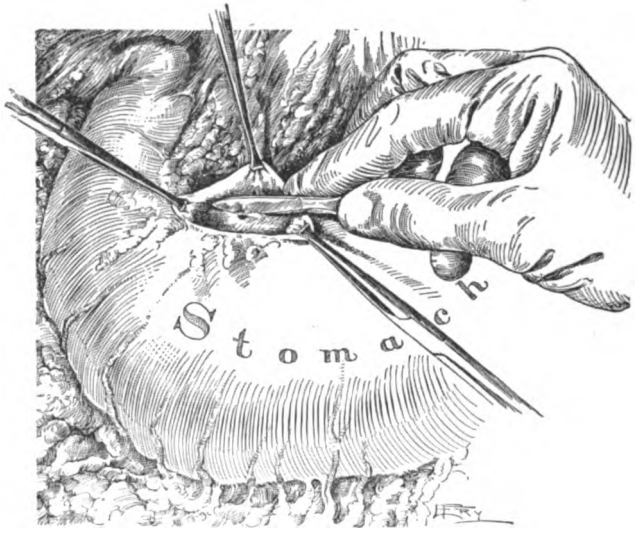

Fig. 1.—Shaving of thickened musculoperitoneal coats.

the cautery (Fig. 3). This observation seems important because it shows the frequency with which this perforation can be demonstrated, and that chronic perforation occurs in practically all chronic ulcers. Knowing from palpation the size of the crater of the ulcer, the cauterizing is maintained until an opening as large as the crater is made. In this way, as I have

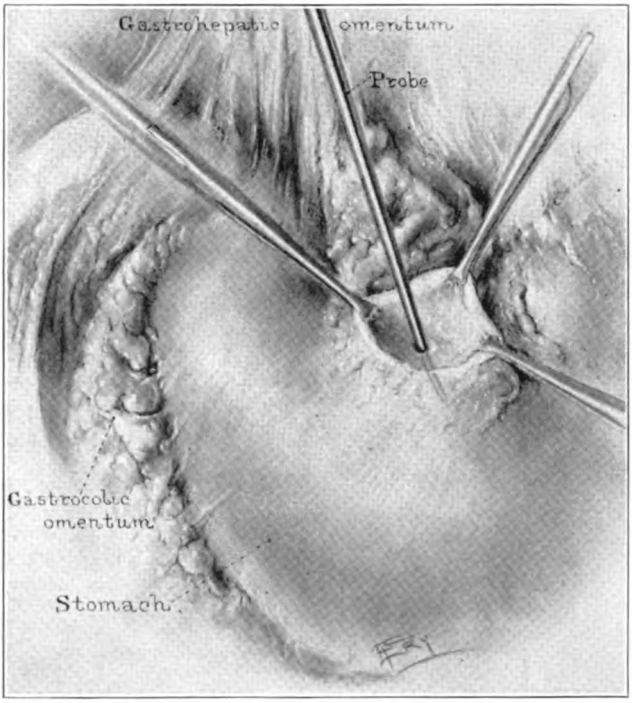

Fig. 2.—Probe introduced through the site of chronic perforation.

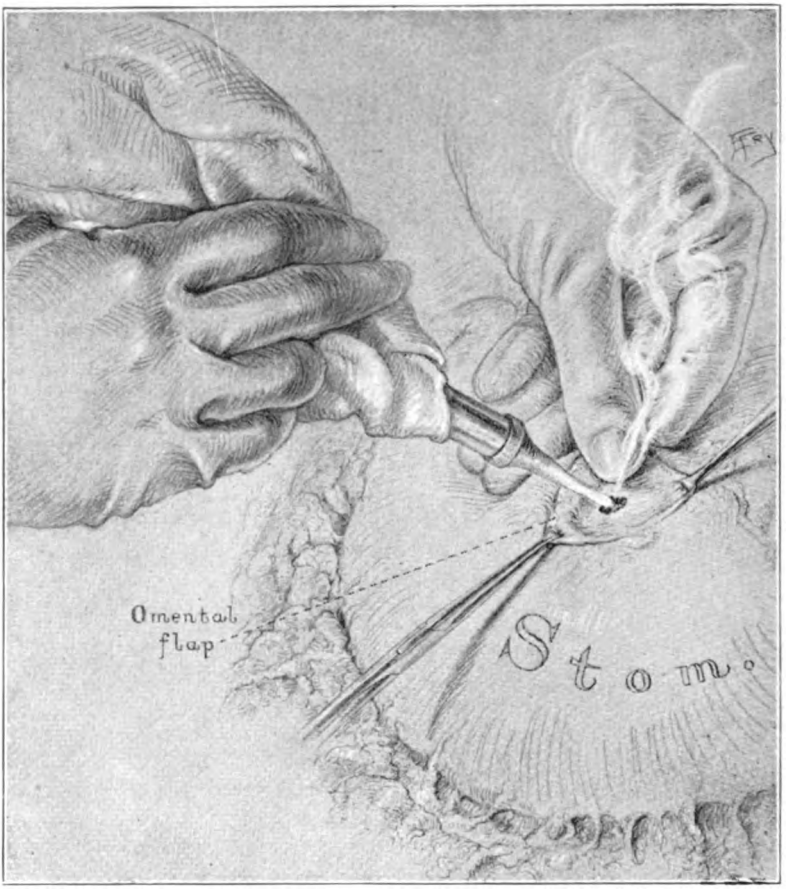

Fig. 3.—Peritoneal surface of ulcer prepared for application of cautery.

pointed out in previous articles,[4] any malignant cells within an area of 2 cm. of the cautery point are killed, and the danger of cancer-cell grafting, which

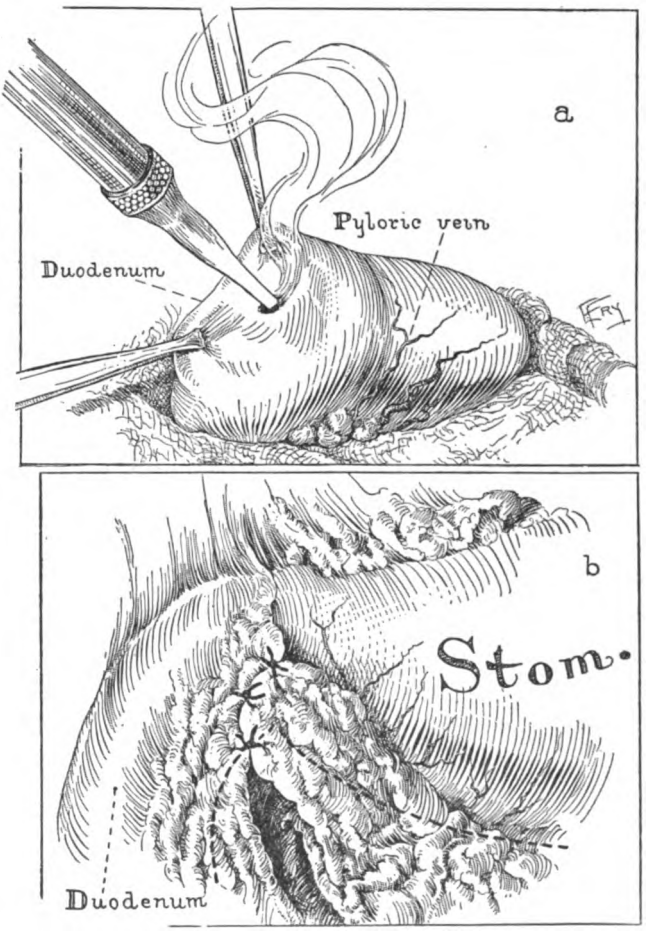

Fig. 4.—*a*, cautery puncture over a small duodenal ulcer; *b*, completed operation; omentum implanted over site of closure.

is always present in knife excision, is avoided. The opening is subsequently closed with fine chromic catgut, and with reinforcing sutures of silk.

4. Balfour, D. C.: Ann. Surg. **67**: 725-731 (June) 1918; Treatment by Cautery of Gastric Ulcer, Surg., Gynec. & Obst. **19**: 528-530 (Oct.) 1914.

Cauterization is simpler in duodenal than in gastric ulcers, as the duodenal ulcer is usually in direct view and is rarely protected by any surrounding tissue; moreover, the crater of the ulcer is often very small, so that only puncture of the ulcer is required

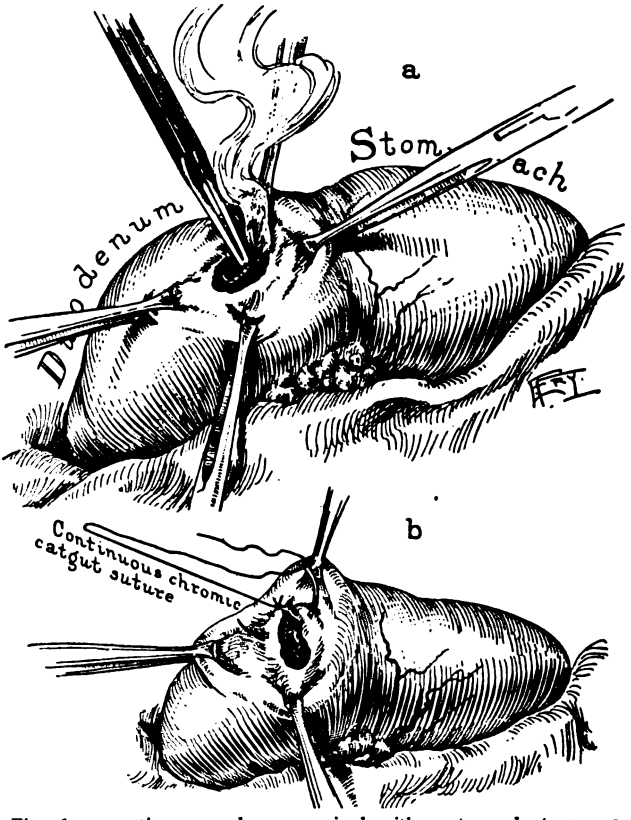

Fig. 6.—*a*, entire scarred area excised with cautery; *b*, transverse closure of cauterized opening by first row chromic catgut.

(Fig. 4 *a* and *b*). The cautery in duodenal ulcer was first employed in ulcers of the bleeding type, but lately it has seemed advisable to destroy, in this manner, practically all duodenal ulcers which are readily accessible (Figs. 5, 6 *a* and *b*, and 7).

Fig. 5.—Ulcer of the duodenum apparently healed but the cause of recurring hemorrhage. Silk suture which had been placed at a previous operation.

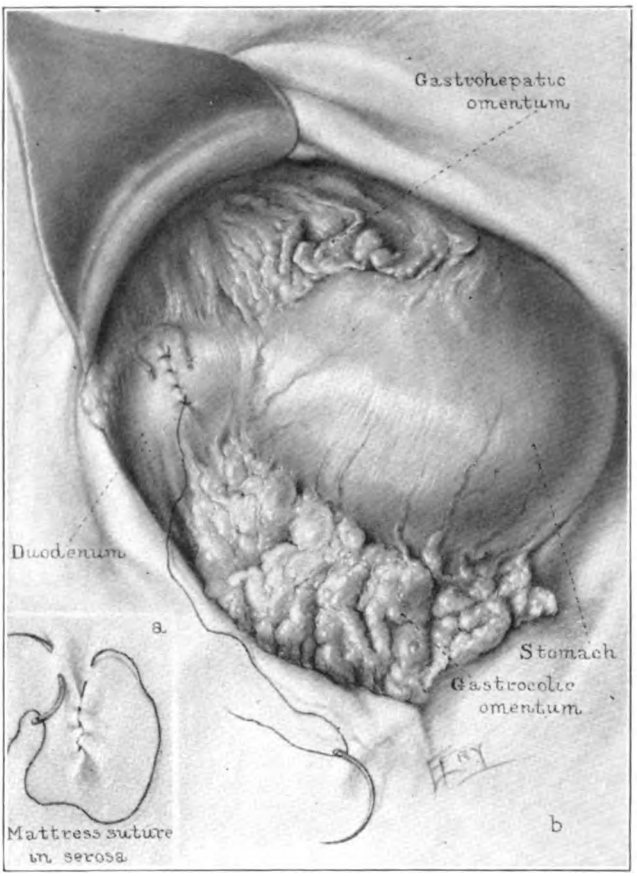

Fig. 7.—*a*, cauterized opening closed by row of catgut; *b*, closure reinforced by a returning second continuous suture.

SUMMARY

The points I desire to emphasize are:

1. Hemorrhage following operations for both gastric and duodenal ulcer is of sufficient frequency (2 per cent. in duodenal ulcer and 1+ per cent. in gastric ulcer) to warrant a revision of operative methods in such cases.

2. Gastro-enterostomy or pyloroplasty alone does not always protect against further hemorrhages, while excision of the ulcer and gastro-enterostomy gives almost total protection.

3. Excision by cautery combined with gastro-enterostomy is the most satisfactory method in the majority of cases of minimizing the possibility of recurrence of hemorrhage in all ulcers which have been associated with hemorrhages, and similar treatment seems advisable in both gastric and duodenal ulcers which have not exhibited such a complication.

A NEW OPERATION FOR DUODENAL AND GASTRIC ULCER

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There is no excuse for a new operation if the old ones are satisfactory. The results of a surgical operation are the test of its efficiency, and they should be viewed from two standpoints: First, and most important, is the clinical result and, secondly, the restoration of tissues or organs to their normal physiologic condition. It seems probable that no important physiologic function of the body can be abolished or seriously altered without creating a disturbance of health in at least some of the individuals thus affected.

The usual surgical treatment for duodenal or gastric ulcers is gastro-enterostomy, with or without excision of the ulcer. When done for gastric ulcer, the ulcer is either excised or cauterized with the actual cautery (Balfour). When the gastro-enterostomy is for a duodenal ulcer, the ulcer is usually not excised, but is often sutured over or folded in. Another type of operation employed is the pyloroplasty of Finney.

GASTRO-ENTEROSTOMY

The clinical results from gastro-enterostomy when performed for duodenal or for gastric ulcer are by no means perfect. D. C. Balfour[1] says:

> Although evidence is conclusive that surgery gives permanent relief in a higher percentage of cases and with less associated risk than any other therapeutic measure, it is also true that the surgical treatment of gastric ulcer may be made still more efficient.

He reports end-results of 285 cases of gastric ulcer in which operation was performed at the Mayo Clinic

1. Balfour, D. C.: Results of Surgical Treatment of Gastric Ulcer, Surg., Gynec. & Obst. 24:731 (June) 1917.

from Jan. 1, 1906, to July 1, 1915, with 159 (55.7 per cent.) cures. The rest are classified as "greatly improved," "improved," and "unimproved."

Frank Smithies of Chicago, who was formerly gastro-enterologist at the Mayo Clinic and is now at the Augustana Hospital of Chicago, has long been associated as a medical man with large surgical clinics in which gastro-enterostomy is the chief surgical method of dealing with gastric or duodenal ulcer. He[2] reports observations on 273 patients on whom gastro-enterostomy had been done for the relief of dyspepsia. His paper was intended as a study of the function of the stomach after gastro-enterostomy, but the side-lights on the efficiency of this operation as a therapeutic measure are illuminating.

Smithies' 273 cases represent 226 patients operated on for gastric or pyloric ulcer, twelve for gastric cancer, and thirty-five for duodenal ulcer not involving the pylorus. Of this entire number, he reports only fifty-seven, or 20.9 per cent., clinically complaint free. Twenty-eight[3] (80 per cent.) of the thirty-five duodenal ulcer patients had pain or distress, and many of this number had other symptoms, such as gas, nausea, vomiting, or eructation. However, as the total number of cases is made up of (1) patients requested to return for examination regardless of their condition and (2) patients who came voluntarily because they were having trouble, the percentage of cures represented is too low. In reply to a request, Dr. Smithies has written me under date of April 10, 1919, that about 65 per cent. of the 273 patients (177) returned for examination at his request. Percentage based on this number (177) would be unduly favorable because these cases were selected apparently arbitrarily from a large number of stomach cases in which operation had been performed and which had been observed by him

2. Smithies, F.: Gastric Function Following Gastro-Enterostomy, Surg., Gynec. & Obst. **26**: 275 (March) 1918.

3. Smithies, F.: Gastric Function Following Gastro-Enterostomy, Surg., Gynec. & Obst. **26**: 277 (March) 1918, Table IV.

(2,360) and do not include those patients who came voluntarily because of trouble. Making all allowances for this latter group, which constitutes about one third of the total number, we still have a percentage of complaint-free patients that is very low (much below 50 per cent.) both for gastric and for duodenal ulcer patients on whom gastro-enterostomy had been done.[4]

These results as reported by Balfour and by Smithies certainly cannot be considered satisfactory so far as curing the patients is concerned.

It is obvious that gastro-enterostomy for duodenal or gastric ulcer does not restore the stomach to its normal physiologic condition. The clinical cures following this operation have been variously explained. Some have said that it is a gravity drainage operation, and yet in draining other hollow muscular viscera we do not open at the lowest point. The gallbladder and the urinary bladder are drained from the part opposite the most dependent portion, and an enterostomy is done on the loop of intestine nearest the obstruction and not on the loop deepest in the pelvis; for we know that normal contraction or peristalsis will keep the bladder or bowel empty if an opening is made. From time immemorial the current of pressure and the peristaltic rhythm of the stomach have been focused on the pylorus, and not on the so-called lowest point in the stomach. Besides, there is no one portion of a mobile muscular organ, such as the stomach, that is always at the lowest point. This and other disadvantages of gastro-enterostomy have been admirably demonstrated by Cannon and Blake.[5] It has been affirmed that gastro-enterostomy cures by short-circuiting the course of food and so resting the ulcer; and also that it cures by lessening the acidity of the gastric juice. The roentgen ray has shown that unless the pylorus is closed some food usually continues to go by this route and pyloric

4. Smithies, F.: Gastric Function Following Gastro-Enterostomy, Surg., Gynec. & Obst. **26**: 277 (March) 1918, Tables III and IV.

5. Cannon and Blake: Gastro-Enterostomy and Pyloroplasty, Ann. Surg. **41**: 686-711 (May) 1905.

closure is not often permanent unless a resection is done.

Lennander's[6] statement that the stomach is without sensory nerve supply for pain has been apparently disproved. Other investigations[7] seem to have shown that the stomach has a limited supply of nerves that conduct pain. These nerves terminate in the muscular coat of the stomach, and do not reach the mucosa. It has been demonstrated that the pains that come on with such clocklike regularity after meals in duodenal or gastric ulcer are not caused by acid erosion of the ulcer by the hyperacid gastric juice, as was formerly believed, but are due to the pressure of peristalsis on these gastric nerves, which are made unusually sensitive by the inflammation of the ulcer.[8] Consequently, they register impulses of pain from the pressure of peristalsis that in a normal physiologic condition they would not register. The character of the gastric juice has nothing to do with the pain except so far as it excites peristalsis. Gastro-enterostomy probably relieves the pain from a duodenal or gastric ulcer by facilitating the emptying of the stomach, thus lessening peristalsis. This is largely the treatment of a symptom and not an effort to remove a pathologic condition and restore tissues to their physiologic state.

The dangers of vicious circle, jejunal ulcer, volvulus, or hernia into the lesser peritoneal cavity, though not great, yet exist when a gastro-enterostomy is done and are not present in operations on the pylorus.

FINNEY'S PYLOROPLASTY

When pyloroplasty is done, the method usually employed is that of Finney. Finney's operation, as is well known, consists of a horseshoe-shaped incision

6. Lennander, K. G.: Abdominal Pain, Especially Pain in Connection with Ileus, J. A. M. A. **49**: 836 (Sept. 7) 1907.

7. Kast, L., and Meltzer, S. J.: Sensibility of Abdominal Organs and the Influence on It of Injections of Cocain, Med. Rec. **70**: 1017 (Dec.) 1906. Ritter, C.: Sensibilität der Bauchorgane, Zentralbl. f. Chir. **35**: 609 (May 16) 1908.

8. Ginsburg, H.; Tumpowsky, I., and Hamburger, W. W.: The Newer Interpretation of the Gastric Pain in Chronic Ulcer, J. A. M. A. **67**: 990 (Sept. 30) 1916. Hardt, L. L. J.: Pain in Active Pathologic Processes in Stomach or Duodenum, ibid. **70**: 837 (March 23) 1918.

with its center at the pylorus, one limb extending down on the mobilized duodenum, and the other on the stomach near the greater curvature. These limbs of the incision are united by suturing the posterior margin of the wound in the duodenum to the posterior margin of the wound in the stomach, and the anterior margin of the wound in the duodenum to the anterior margin of the wound in the stomach. Many of the objections that apply to gastro-enterostomy do not obtain here, as the operation is done at the normal physiologic outlet of food from the stomach. Finney and Friedenwald[9] report a group of 100 cases in which operation was performed by Finney's method. Five of the patients died soon after the operation. The final results in seventeen are unknown, as the patients could not be traced. Of the remaining number, results are classified as being satisfactory in seventy-three, or 93.6 per cent. of those traced. It is not stated whether the term "satisfactory" means "complaint free." If it does, the results are excellent, but, if not, it would be difficult to compare these statistics with those of Balfour or of Smithies. At any rate the results appear to be better than after gastro-enterostomy. Finney and Friedenwald say that the contraindications for this operation are inability to mobilize the duodenum, and thickening and infiltration about the pylorus.

Finney's operation, while a distinct improvement on gastro-enterostomy, is not free from objections. It seems to have been conceived partly with the idea of making it a gravity drainage operation, when, as already pointed out, drainage of a hollow muscular organ, such as the bladder or bowel, does not have to be from the lowest point in order to be effective. Mobilization of the duodenum, which is necessary for this operation, may be quite difficult and, according to Finney, where numerous adhesions exist, his operation

9. Finney, J. M. T., and Friedenwald, Julius: Thirteen Years' Experience with Pyloroplasty, Surg., Gynec. & Obst. **18**: 273-284 (March) 1914.

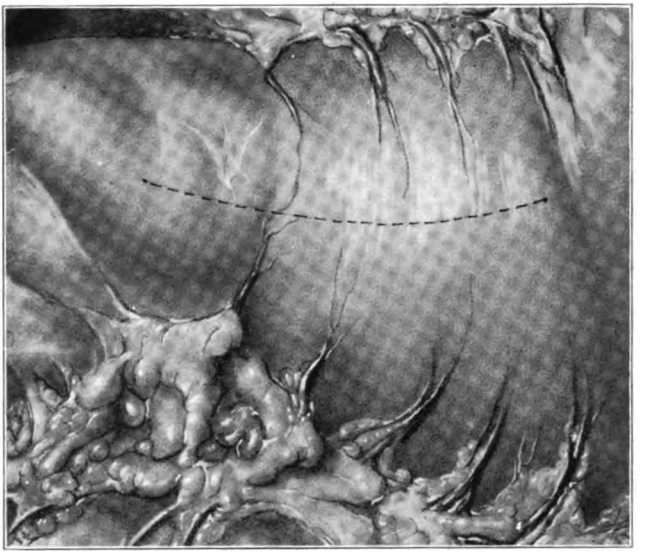

Fig. 1.—The incision is made from a point on the anterior surface of the duodenum not farther from the pylorus than 1 inch, extending into the stomach, midway between the greater and lesser curvatures, not less than two inches. These points are fixed with forceps or sutures before the gauze is placed.

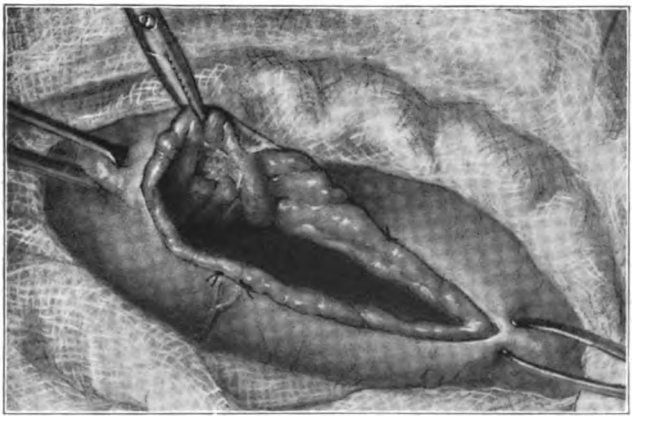

Fig. 2.—The opening in the stomach has been made; first, by cutting down to the gastric mucosa and clamping as many vessels as possible before opening the mucosa; then the incision is extended into the duodenum for not more than one inch. The ulcer is excised from the mucous surface.

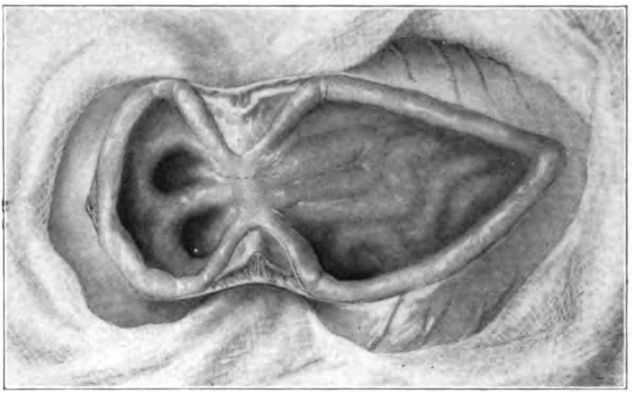

Fig. 3.—If there is marked stenosis, pockets will result on the duodenal side. These are obliterated by incisions of the mucosa and of the constricting bands. To avoid hemorrhage these incisions should be short and not too deep.

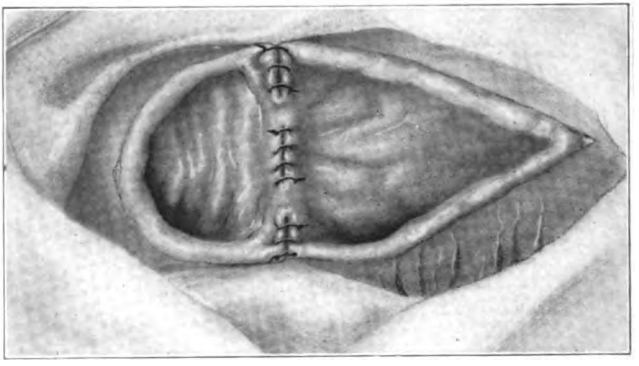

Fig. 4.—The incisions in the mucosa dividing the bands are sewed up transversely, and, if necessary, along the upper and lower border of the stenosis the mucosa of the duodenum is sutured to the mucosa of the stomach. It is essential to have a complete mucous membrane covering for the posterior wall.

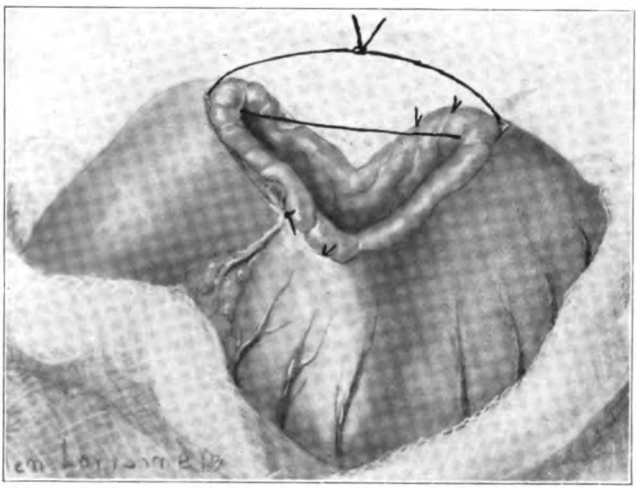

Fig. 5.—In the first step of closing the incision, a suture of tanned catgut is inserted from the end of the stomach incision to the end of the duodenal incision. Then a second suture is placed half way between this stitch and the upper angle of the wound.

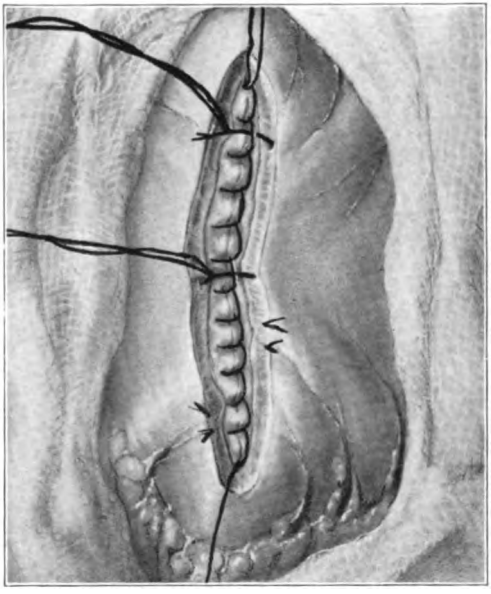

Fig. 6.—These two interrupted sutures are tied, their ends left long, and the suturing is begun at the lower angle with a curved needle and tanned catgut. A continuous lock stitch is used which gently approximates the mucosa. The two interrupted sutures, with the ends left long for traction, greatly facilitate suturing.

Fig. 7.—A second row, mattress or right-angle sutures, is placed, burying the first row in the mucosa; and then a third row, which takes in the peritoneum and muscle, buries both the other rows.

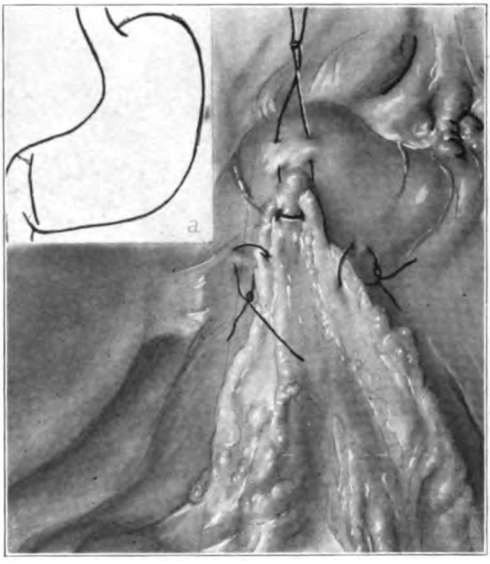

Fig. 8.—A piece of gastrocolic omentum is brought over the incision and fastened with interrupted stitches of tanned catgut. Inset (*a*) shows, diagrammatically, that the pylorus is widened but not destroyed, that the outer end of the stomach is converted from a cone to a rectangle, and that there are no constrictions or pockets.

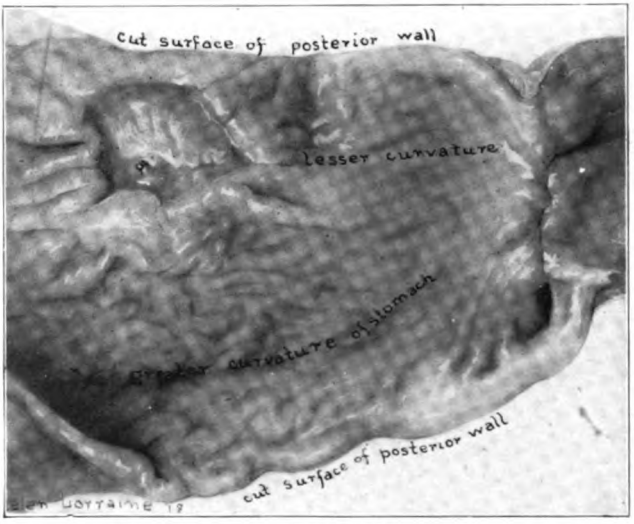

Fig. 9.—Drawing of stomach removed at necropsy of A. R. The incision was made in the posterior wall of the stomach. Note the ulcer that involves the lesser curvature and the large blood vessel protruding in the ulcer. Also note the healing of the pyloroplasty, which makes a wide opening. The patient died from hemorrhage from the gastric ulcer twenty-one days after operation.

Fig. 10.—A roentgenogram of the stomach of W. J. B., taken two days before operation. There was constant deformity of the duodenal cap. The patient had been suffering for a number of years. The diagnosis was duodenal ulcer.

Fig. 11.—A roentgenogram of the stomach of W. J. B., taken four months after the pyloroplasty. Note the improved tone of the stomach and the ready emptying.

Fig. 12.—A roentgenogram of the stomach of Mrs. G. A. H., taken about one year after pyloroplasty. The patient had had a previous duodenal perforation, and there were numerous adhesions. The stomach is emptying satisfactorily.

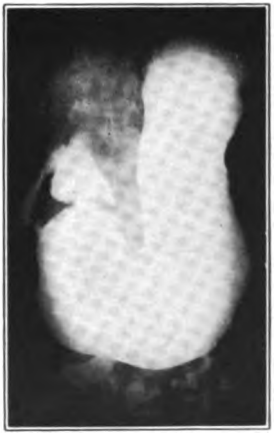

Fig. 13.—A roentgenogram of the stomach of Miss E. D. H., taken four and one-half months after the pyloroplasty for duodenal ulcer. The patient had marked ptosis. There were no adhesions. The pylorus, as shown, is functioning normally, with a perfect duodenal cap. The pylorus is a little wider than normal.

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often cannot be done. The incision is made near the greater curvature of the stomach, where the vessels are large. The pylorus is divided in such a manner that it cannot reunite, and its sphincteric action would seem to be permanently impaired. If there is cicatricial contraction at the pylorus, the scar tissue must be sutured to scar tissue, for the apex of both the posterior and anterior margins of the sutured wound are at the pylorus.

HEINEKE-MIKULICZ OPERATION

The Heineke-Mikulicz operation, which was conceived to remedy pyloric stenosis, is generally supposed to be a straight incision with its center at the pylorus or at the point of constriction, the incision being sewed up transversely. Such is the description of the Heineke-Mikulicz operation as it appears in many textbooks.[10] In Binnie's Operative Surgery, 7th edition, p. 385, a description is given of this operation that resembles somewhat the Finney operation. However, the Heineke-Mikulicz operation in its usual conception as being a straight incision with its center at the point of constriction or at the pylorus, the incision being sewed up transversely, finds but few advocates. Grey Turner[11] reports a small series of cases done by this method in which the results are quite satisfactory. As a rule, however, these objections are made to the Heineke-Mikulicz as ordinarily performed: 1. It creates a pouch with a slight constriction on the stomach side and on the duodenal side. Half of this pouch is made of the duodenum whose walls are much weaker than the walls of the stomach and it may be difficult to empty such a pouch. 2. The incision cannot be made very long because it would extend too far into the duodenum, which would have to be mobilized, and even then the tension of the sutures on the thin duo-

10. Bryant: Operative Surgery **11**: 943, 1905. Dacosta: Modern Surgery, Ed. 7, 1918, p. 1081. American Text-Book of Surgery, Ed. 4, p. 790. Warbasse: Pyloroplasty by Surgical Treatment, **11**: 738, 1918.
11. Turner, G.: Surg., Gynec. & Obst. **14**: 537 (June) 1912.

denal wall would be too great. 3. When stenosis exists, each end of the sutured wound consists of scar tissue which is sutured to scar tissue, for the center of the incision is at the point of constriction. 4. There is a tendency in healing for the pylorus to be drawn up high under the liver.

THE NEW PYLOROPLASTY

There is one part of the body in which an ulcer in the region of a sphincter has been the object of surgical observation since the earliest times of recorded surgery, and the treatment of this condition has become satisfactorily standardized. This is ulcer or fissure in ano. The analogy between an ulcer in ano and a duodenal or pyloric ulcer of the stomach which is in the region of the pyloric sphincter is striking. We know that the ulcer in ano does not heal readily because of the almost continuous action of the sphincter ani, which alternately compresses or relaxes the tissues in its neighborhood, and that in order to cure it we must employ the principle of physiologic rest and paralyze the sphincter temporarily, and at the same time excise or cauterize the ulcer. In this manner we remove the pathologic condition and institute rest for these tissues. We would not think of treating a fissure in ano by doing a colostomy and side-switching the fecal contents, particularly if the colostomy permitted a small amount of fecal matter to continue to pass through the anus; and yet in performing a gastro-enterostomy for the cure of a pyloric or duodenal ulcer we are practically doing just this very thing. By using the well known surgical principles that have been established for years for the treatment of fissure in ano, namely, temporary paralysis of the sphincter and excision or cauterization of the ulcer, we can cure practically 100 per cent. of such cases. If, then, the ulcer in the duodenum or pylorus is not cancerous and is the only pathologic lesion, have we not a right to expect as good results here, so far as ultimate cure is concerned,

by excision of this ulcer and temporary paralysis of the sphincter muscles, as has been obtained since the early days of surgery by similar treatment of an ulcer within the region of the sphincter ani? The operation here proposed has been conceived on these principles, and an effort has been made to carry them out as far as possible, at the same time avoiding the objections that have been noted to other types of pyloroplasty. The steps of the operation are:

1. The upper portion of the duodenum and the pyloric end of the stomach are exposed through an ample abdominal incision, and a point is selected in the midline of the anterior surface of the duodenum an inch from the pylorus, and another point on the stomach not less than two inches from the pylorus and midway between the greater and lesser curvatures (Fig. 1). Each of these points is grasped with Allis forceps or fixed with a suture. The stomach and duodenum are then surrounded with moist gauze.

2. An incision is made with a sharp knife from the point on the duodenum to the point on the stomach. If the ulcer is in the anterior surface of the duodenum, the incision should pass along the lower edge of the ulcer (Fig. 1). An effort is made to divide the peritoneal and muscular coats without opening the mucosa. The incision should go no farther than 1 inch into the duodenum. It extends 2 inches or more into the stomach. The bleeding points or exposed vessels are clamped.

3. The mucosa is incised and any further bleeding points are clamped, care being taken to include as little of the mucosa in the grasp of the forceps as possible. The vessels are tied with catgut (Fig. 2). If there is a tendency for duodenal contents to regurgitate, gauze wrung out of warm salt solution is gently packed into the duodenum. Moist gauze can also be placed in the stomach if necessary. If the ulcer is along the incision, it is excised from the mucous surface and the forceps, scissors, and knife used in the excision are laid aside, as they are probably septic. Because the mucosa in this region is almost free from bacteria except in the ulcer, there is no occasion to disinfect the normal mucosa, as there would be in operations on the intestine lower down.

4. If the ulcer is in the posterior wall of the duodenum or pylorus, the wound is retracted, the ulcer exposed and excised, the deeper structures are sutured with tanned or chromic catgut, and the mucosa is gently approximated by a continuous suture. The suture in the mucosa must not be tight, as this might cause necrosis of the mucosa and spread the ulcer. If there is an old contraction resulting in pockets, the mucosa and the contracting band should be divided and

the mucosa sutured transversely to the incision. To avoid hemorrhage, the incision that relieves the contracting band should be short and should divide only the superficial part of the band. The neglect of this precaution resulted in a fatal secondary hemorrhage in my last pyloroplasty (Figs. 3 and 4).

5. The ulcer having been removed or pockets and contractions remedied, the ends of the incision are approximated by a tanned or chromic catgut suture (Fig. 5). A second suture of similar material placed half way between this middle suture and the upper angle of the wound renders suturing the upper half of the incision easier. Both are tied and their ends left long to facilitate suturing and to hold up the edges of the wound if there is a tendency of gastric or duodenal contents to overflow. A No. 1 tanned or chromic catgut suture is then started at the lowest portion of the wound, *which is in the stomach wall.* It is tied, the short end clamped, and the mucous membrane united by a lock stitch which barely approximates the mucosa and ends at the upper portion of the incision, *which is also in the stomach wall.* Before completing this suture any gauze packing in the duodenum or stomach is removed. The suture is tied at the upper portion of the wound and the ends are left long and clamped (Fig. 6).

6. A second row of sutures, consisting of the same kind of catgut, in a curved round needle, is inserted, taking in the muscular coat. This is a continuous mattress or right-angle stitch. Only enough tissue is included in the sutures to secure a firm hold. The long ends of the previous row are cut short.

7. A third row of sutures of fine tanned or chromic catgut is placed, but the gauze around the stomach and duodenum should be removed before this third row is begun, as gauze packing hinders the approximation of the peritoneum. This row includes the peritoneum and muscular coats and buries the first and the second rows of sutures completely. This is also a continuous mattress suture (Fig. 7).

8. A portion of the gastrocolic omentum, or else the right edge of the great omentum, can be brought up over the line of incision without tension. It is fastened here with interrupted stitches of fine catgut. Care should be taken that it barely covers the upper end of the sutured wound and that it is not fastened to the gastrohepatic omentum, as this might result in too complete a surrounding of the pyloric end of the stomach (Fig. 8).

9. If the ulcer is not in the duodenum or the pyloric region, the operation, as just described, may be done in order to relieve the spasm of the pylorus and the ulcer then excised, or cauterized, as advocated by Balfour, through another gastric incision.

The advantages of this operation are:

1. It removes the obstruction and the pathologic condition, and permits the normal resumption of the stomach function.

2. The ends of the sutured incision are within the stomach wall. The ratio of the incision should never be less than two parts in the stomach to one in the duodenum. Usually 2 inches in the stomach and 1 in the duodenum are sufficient. The anterior stomach wall in the midline can readily be pulled over to the first inch of the duodenum. In the Heineke-Mikulicz operation, and also in the upper part of the Finney operation, the ends of the sutured incision are in the scar tissue at the pylorus, while in this operation the ends of the sutured incision are within the healthy stomach wall, and the scar tissue that may remain about the pylorus is approximated, not to other scar tissue, but to healthy stomach wall. Consequently, union should be more satisfactory than where scar tissue is opposed to scar tissue, as in the other two types of pyloroplasty.

3. There is no pouch formation as in the Heineke-Mikulicz operation, in which the center of the incision is at the pylorus. The operation merely changes the shape of the pyloric end of the stomach from a funnel with gradually approaching walls to a rectangle that empties into a funnel with a more obtuse angle.

4. The parts to be put at rest are the parts most concerned in contraction and relaxation, which are the pylorus and the adjacent portion of the stomach. By making the incision from the duodenum about 2 inches into the stomach, this is effected. A long incision into the duodenum does not help in any way.

5. The function of the pylorus and pyloric end of the stomach is not permanently destroyed. The stomach wall that is brought over acts as a link between the ends of the pyloric sphincter, and, in the course of time (usually a few weeks), the sphincter resumes its action, though, because it has been enlarged, it cannot become spastic as it was before the operation.

6. The operation is simpler than the Finney operation, in which the duodenum has to be mobilized and the posterior and the anterior margins of the wound must be sutured separately.

There is a superficial resemblance between this operation and the Heineke-Mikulicz, because in both operations the pylorus is divided and in both the incision is approximately straight. Here, however, the resemblance ceases, and the differences become marked, for, unlike the Heineke-Mikulicz, the operation

described was conceived on the principle of giving temporary physiologic rest to tissues in the pylorus and the pyloric end of the stomach; the incision is longer than in the Heineke-Mikulicz operation; it is differently placed; it extends not more than 1 inch into the duodenum nor less than 2 inches into the stomach; it can be considerably prolonged at the stomach end; it gives an excellent view of the pyloric end of the stomach; it requires a rather definite technic to be closed satisfactorily; it does not form a pouch with a constriction fore and aft; it does not approximate scar tissue to scar tissue, and an essential part of the operation is the removing or remedying of the pathologic condition by excising the ulcer, obliterating pockets, or incising constricting bands (Figs. 2, 3 and 4). In addition, the reinforcing with omentum (Fig. 8) adds security to the sutures, prevents adhesions to surrounding tissues, and counteracts the tendency for the pylorus to become fixed high up under the liver, which sometimes occurs after the Heineke-Mikulicz operation.

The postoperative treatment is about the same as that employed for gastro-enterostomy. If there is any vomiting or marked discomfort, the stomach should be promptly washed out under low pressure, not more than a pint of fluid being used at a time. The head of the bed is elevated from 12 to 18 inches, and the patient is given one-half ounce of hot water every hour for the first twenty-four hours and after that 2 ounces of hot water every hour for twenty-four hours. Enemas of 6 ounces of physiologic sodium chlorid solution with one-half ounce of glucose and 1 dram of sodium bicarbonate are given every six hours for the first two days. At the end of forty-eight hours a small amount of liquid nourishment, but not including milk, is commenced and continued until the fourth day after operation, when milk is added to the diet. About the seventh or eighth day after operation a purgative is given and soft diet is begun.

CLINICAL REPORT

The first operation of the new pyloroplasty was done on Mrs. G. A. H., April 4, 1918. Five days later, April 9, I did a gastro-enterostomy on a man with duodenal ulcer. In the case of Mrs. G. A. H., gastro-enterostomy could not be performed because there were extensive adhesions in the lesser peritoneal cavity. Gastro-enterostomy was done on the man because I was not then assured of the full value of the pyloroplasty. Mrs. G. A. H., however, made such a satisfactory recovery that I have done the pyloroplasty in every case of duodenal or gastric ulcer since April 9, 1918, and since that date I have not done a gastro-enterostomy.

I have so far done eleven of the new pyloroplasties. Three of the operations were for gastric ulcer, two being for ulcer in the cardiac portion of the stomach on the posterior wall near the lesser curvature. In both of these cases, the ulcer was in a similar location and was reached through an incision in the anterior wall of the stomach.

CASE 1.—A. R. was operated on Sept. 23, 1918, for gastric ulcer. The ulcer had not quite perforated, though the peritoneum appeared to be slightly adherent behind. The margins of the ulcer were excised, the mucosa was brought together with mattress stitches of tanned catgut, and then the pyloroplasty was done. The patient made an uneventful recovery from the operation and appeared to be doing well until the eighteenth day, when he had a moderately severe hemorrhage from the stomach. After gastric lavage with hot water the bleeding seemed controlled. Twenty-four hours later, however, he began vomiting blood and, in spite of gastric lavage and transfusion of blood, he died, Oct. 14. 1918. Necropsy was held a few hours after the death of the patient, and the stomach was obtained. It showed that the pylorus had healed satisfactorily, but the ulcer had extended to the lesser curvature and involved a blood vessel of considerable size, which was protruding from the ulcer. From this vessel the hemorrhage apparently had come (Fig. 9). Doubtless the ulcer was sutured too tightly, necrosis of the mucosa resulted, and the ulcer spread.

CASE 2.—In the second patient with gastric ulcer (L. B.), an ulcer in a similar location had perforated and a small

abscess had formed. A transgastric operation was done, Sept. 27, 1918, and an effort was made to approximate the edges of the ulcer by mattress sutures and a continuous lock stitch within the stomach. The pyloroplasty was then done, and a drainage tube carried down to the abscess anteriorly, without disturbing the adhesions elsewhere. In three days the gastric contents appeared through the drainage tube. The fistula closed in about three weeks, and the patient went home and improved considerably. Four months later, however, he began to have symptoms similar to those before operation. A roentgenographic examination by Dr. A. L. Gray, May 11, 1919, revealed spastic hour-glass contraction about the ulcer, but the pyloric end of the stomach was emptying rapidly and satisfactorily. The patient was again operated on, May 13, 1919. There was no abscess, but the ulcer persisted and was adherent to the liver and pancreas. The ulcer and a portion of the surrounding healthy stomach wall were excised. There were considerable adhesions, but the pylorus appeared to be in a satisfactory condition. The patient is recovering uneventfully.

CASE 3.—In the case of M. L. S., the ulcer was prepyloric, being about 1 inch from the pylorus on the posterior gastric wall near the greater curvature. This ulcer was easily excised through the incision for pyloroplasty (May 6, 1919), an operation which gave excellent exposure. The patient recovered uneventfully and is now complaint-free.

Two patients were operated on for stenosis of the pylorus and six for duodenal ulcer. The stenosis was marked with a large amount of connective tissue in both cases. The cicatricial band that formed pockets posteriorly was cut, as shown in Figures 3 and 4, and the mucous membrane sutured transversely to the incision. Of the six duodenal ulcer cases, three had extensive adhesions. In two of these there had been a previous perforation with leakage of the duodenal contents. In one, operation was done about three months after the perforation, and in the other about sixteen months after perforation. Of the remaining three cases two were simple nonadherent duodenal ulcers on the anterior surface of the duodenum and the third was on the upper border of the duodenum.

CASE 4.—All the patients except this one (Mrs. W. W. H.) were examined roentgenographically, and a diagnosis of ulcer was made before operation. In this instance the patient weighed about 230 pounds, and the history seemed to indicate

gallbladder trouble. Operation showed the gallbladder thickened, moderately adherent and without stones, but there was an ulcer in the upper border of the duodenum which appeared about to perforate. On account of the fat of the patient and the fact that the duodenal portion of the pyloroplastic incision was placed too near the ulcer, the operation was more difficult in this instance than in any other. She is now complaint free.

This series of cases represents most of the types of ulcer that we have seen, and yet the operation could be done effectively in each case, though in two there was pyloric stenosis and much scar tissue, and in two there had been previous duodenal perforation followed by extensive adhesions.

FINAL RESULTS

Nine of the eleven patients are now living and have been communicated with during the last few weeks. One gastric ulcer patient (L. B.), as described above, has recently been reoperated on for excision of the gastric ulcer, which was not cured by the original operation. He is recovering satisfactorily. The prepyloric ulcer patient, M. L. S. (operated on May 6, 1919), is in excellent condition and is complaint free. Of the two patients with pyloric stenosis, one (F. P. B., operated on May 15, 1919, and the last pyloroplasty that was done) recovered uneventfully till the eighth day after operation, when secondary hemorrhage began, and, in spite of gastric lavage with hot water and transfusion of blood, the patient died the tenth day after operation. Necropsy showed the bleeding came from small vessels in the region where the posterior cicatricial band was cut. The anterior pyloroplasty incision was in excellent condition and the pylorus was wide open. The other (R. D. L., operated on Jan. 22, 1919) has gained 30 pounds and is complaint free. Of the six duodenal ulcer patients (operated on April 4, July 3, July 30, Oct. 4, 1918, Jan. 22, March 31, 1919) four are entirely complaint free. Two express themselves as being greatly improved, but still have minor symptoms, such

as occasional gas and gastric discomfort, particularly when imprudent in their diet. Of these two patients one (Miss E. D. H.) had, in addition to a duodenal ulcer, marked ptosis of the stomach and transverse colon, but only the pyloroplasty was done and the appendix removed, no operation being done for the ptosis. If this patient wears an abdominal support she is comfortable and complaint free. She says she is greatly improved (Fig. 13). There is no change in weight. She follows her profession as a trained nurse.

In the other patient (W. W. G.) there had been severe hemorrhage a few days before operation, and at the time of operation there appeared to be acute cholecystitis, the gallbladder being enlarged and congested, and the duodenal ulcer, which had been demonstrated by the roentgen ray previous to operation, was small and nonadherent. The pyloroplasty was done, but, as the gallbladder seemed to be the major trouble at the time, it was drained. This patient now looks well, and feels well most of the time, but has occasional "indigestion" and has to be particular about his diet. He expresses himself as being greatly improved; he works hard, and has gained about 18 pounds in weight since a short time before operation. In these two cases the duodenal ulcer was not the sole and probably not even the chief cause of the symptoms. The symptoms from ptosis seem relieved by an abdominal support, and cholecystitis and drainage probably produced adhesions to which may be attributed the few disagreeable symptoms which the other patient now occasionally suffers.

Five patients were, after the operations, studied with roentgen rays by Dr. A. L. Gray, professor of roentgenology in the Medical College of Virginia. His reports show that the pylorus has returned to its function, though it seems to be somewhat more open than usual. In all of the five patients examined by him, the stomach emptied satisfactorily except in one instance

(Miss E. D. H., the patient with ptosis), in which the emptying time, though delayed, is markedly improved over what it was before operation.

Of the five patients in whom the duodenal ulcer (four cases) or stenosis (one case) appeared to be the chief or the only pathologic condition, every one is now complaint free. One has gained 32 pounds, one 30 pounds, one 20 pounds, one 9 pounds, and one (Mrs. W. W. H.) has not gained in weight.

Summing the clinical results, I find there were eleven patients on whom the new pyloroplasty was done, two of whom died. Of this number, three patients had gastric ulcers, with one death, which can hardly be justly attributed to the pyloroplasty; one is complaint free; one had recurrence, which required another operation, done recently, on the ulcer. There were two patients with pyloric stenosis; one is complaint free, the other died on the tenth day after operation of secondary hemorrhage from the incision in the posterior constricting band. This incision had been made too deep. There were six patients with duodenal ulcer; two, in whom the ulcer was probably not the chief pathologic condition, are greatly improved, but not complaint free; and four, in whom the ulcer was the sole or the chief lesion, are complaint free.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. BALFOUR AND HORSLEY

DR. RAYMOND P. SULLIVAN, Brooklyn: Dr. Balfour has presented clearly and concisely the interesting subject of recurrent hemorrhage from a gastric or duodenal ulcer. Three points are worthy of emphasis: (1) From the records of such a large clinic, it is evident that gastric hemorrhage is an indication of ulcer in only 25.8 per cent. of gastric ulcer and 20 per cent. of duodenal ulcer cases. Hence, the diagnosis of ulcer depends more especially on the clinical history and roentgen-ray findings. Gastric hemorrhage no longer has the significance formerly attributed to it in the diagnosis of ulcer, but is a very important factor when preceded or followed by definite symptoms. (2) The technic of handling either gastric or duodenal ulcer should be simple and direct. Excision is indicated in gastric ulcer but, when complicated by

bleeding, duodenal excision or destruction should be practiced. Three methods of excision may be considered: (*a*) Suture exclusion or devitilization. This method is rarely practiced today because of its uncertainty in uniformly removing infected tissue, and it has given way to more direct methods. (*b*) Excision by knife, followed by suture closure, is probably the most universal practice. However, it is apt to be attended by removal of too much tissue predisposing to greater subsequent deformity, or too little, thus favoring recurrence of ulcer, especially if nonabsorbable suture material is used, or retention of early cancer cells. (*c*) Perforation and destruction by actual cautery is direct and is attended by all the advantages of heat for sterilization; destruction of early cancer cells and control of hemorrhage. Whichever method is used, gastro-enterostomy should follow. In all bleeding duodenal ulcers, ligation of vessels immediately proximate to the ulcer must be considered, although undoubtedly Balfour's method of cautery destruction is a direct attack for destruction of the ulcer area. The third practical lesson to be derived from the paper is that gastro-enterostomy is never indicated because of gastric hemorrhage alone. Nevertheless most cases of gastric hemorrhage are probably surgical due to septic condition of the gallbladder and pancreas or spleen or appendix. I wish to draw attention to the fact that a varicose condition of the veins of the cardia, which frequently accompanies heart or liver disease or in arteriosclerosis, may give rise to gastric hemorrhage, especially if lavage is practiced. In dealing with a perforating adherent bleeding ulcer of the posterior wall of the stomach, the operative procedure must depend on the skill and judgment of the operator. Future risk to the patient for recurrent hemorrhage or development of cancer will depend on the radical removal of the ulcer area. In these cases I have used a combined cautery method after careful knife dissection of the adherent area and have had satisfactory results. The figures presented by Dr. Balfour indicate that a cautery destruction of bleeding ulcers offers a greater protection to the patient against recurrent hemorrhage, and it promises to be a standard technic.

DR. ALFRED A. STRAUSS, Chicago: I think Dr. Balfour has given the medical profession something to think about regarding the value of simple gastro-enterostomy. I hope he will be more successful in persuading the profession on this point than I was five years ago, when I insisted that gastro-enterostomy alone has little value in gastric and duodenal ulcer, and that all ulcers should be excised, if at all possible. At that time I demonstrated methods of excising ulcers, not only in the upper portion of the stomach but also in the pyloric region and in the duodenum, by reconstructing those portions of the stomach, after excision of the ulcer, by means of fascial transplants reinforced by the free edge of the attached omentum.

The use of the omentum not only prevents hemorrhage and leakage, but also furnishes a new collateral blood supply to that portion of the stomach. For the ulcers occurring on the posterior wall of the body of the stomach, which are adherent and cannot be freed, the transgastric incision through the anterior wall of the stomach and the Balfour cauterization method are ideal. As to the question of excision versus cauterization, I do not think one can always tell whether or not the ulcer is malignant, as shown by McCarthy of the Mayo Clinic. It can readily be seen that the Balfour method of plunging the cautery into the center of the ulcer may leave the malignant edges of the ulcer. I therefore believe that wide excision by means of the cautery knife is more effective. I do not believe that gastro-enterostomy after excision of the ulcer is necessary. The purpose of this gastro-enterostomy is to give the stomach a normal, or quicker than normal, emptying time and this can be accomplished by a very simple pyloroplasty. By making an incision one inch in length extending from the pyloric ring back onto the stomach, through the muscularis down to the mucosa, and a half inch incision along the ring at right angles to the first incision on each side, a wedge shaped piece of the pyloric muscularis can be removed. This allows the mucosa to bulge and this is covered with the free edge of the attached omentum. This simple plastic operation can be done in a few minutes; it destroys the sphincter control and allows the stomach to empty from one and one half to two hours. A fluoroscopic examination of sixteen cases operated by this method showed the emptying time to be from one and one half to two hours.

Dr. J. B. Blake, Boston: Dr. Horsley has reported his unfavorable as well as his favorable results. If this were not true an operation which suggests the limitation of gastro-enterostomy could not be so well considered. I want to comment on three points in his paper: (1) The parallel which exists between ulcers of the anal sphincter and ulcers of the pyloric sphincter; (2) the function of the pylorus and the importance of maintaining that function, restoring it if possible, and (3) the very great importance of giving this method a fair trial and the necessity of following exactly what Dr. Horsley has pointed out if we are to try his method. So far as I am aware this is the first time that a parallel has been cited between an ulcer of the anal sphincter and ulcer of the pyloric sphincter. At first it seems a little far-fetched but if you will recall what Dr. Horsley pointed out the parallel is closer than one might at first believe. The action of both sphincters is essential to health. One cannot be absolutely normal with the exclusion or removal of either of the two sphincters. The ulcer in one is as much a source of irritation and spasm as in the other. Dr. Horsley referred to the fact that the stomach is not a passive bag and cannot be

drained by a hole in the bottom, that the pylorus is a bit of highly organized physiologic tissue intended to empty the stomach. That it will do so is proved by the fact that any effort of exclusion of the pylorus other than excision has practically never been successful. Even if the pylorus is damaged, it still attempts, and is usually successful in emptying at least part of the stomach. Operations before this time have been of one or two classes. Surgeons have done gastro-enterostomy and excised the pylorus or else they have done one of the exclusion operations which are never successful. I am speaking particularly of cases in which gastro-enterostomy is done and nothing else. Dr. Balfour has shown that in the bleeding ulcer it is not effective, certainly not in ulcers in which bleeding is a prominent feature. If we can substitute an effective operation on the pylorus and restore its function gastro-enterostomy may become unnecessary. No operation can stand, nor should it fall, on the experience or the operative technic of one man alone. Dr. Horsley's operation should be repeated by good operators in all parts of the country. Only then will it be known whether this is going to limit gastro-enterostomy and give something more efficient and more simple.

Dr. Horsley's operation is useful if the ulcer is situated on the anterior surface of the duodenum and if the pyloric ring and antrum are wide. If they are narrow the operation would seem rather difficult. I think a procedure which I have employed a number of times after excision of a duodenal ulcer is more practicable. By taking a tongue-shaped portion of the pyloric antrum and pulling it through the incised ring, the defect left by removal of the ulcer may be corrected. The mucosa and the muscularis are sutured separately and the edges do not have to be inverted. The free edge of the omentum is brought over the operated area. In the ulcers on the lesser curvature demonstrated by Dr. Horsley I do not think that the additional extensive plastic operation for paralyzing the pyloric sphincter is justifiable, when the same effect can be accomplished by cutting a small portion of the pyloric sphincter muscle away, without incising the mucosa.

Dr. John T. Bottomley, Boston: The crux of the matter, of course, is the removal of the ulcer. We must remember, too, that when we excise an ulcer of the stomach or the duodenum we are removing only the end stage of some other pathologic process; hence we should always search for the foci of infection in the gallbladder, appendix, teeth, tonsils, or elsewhere. Even destruction of the ulcer by cautery will not always result in its cure. I have operated on an ulcer of the stomach which had been twice thoroughly cauterized by a most competent surgeon; the symptoms continued until finally resection of the stomach had to be done. No one method is a cure-all in cases of ulcer of the stomach. Destruc-

tion by the cautery is not an absolutely certain method of cure but it is a most excellent method and should be tried. I am surprised that so accurate an observer as Dr. Blake failed to remember that Dr. Codman of Boston years ago called attention to the parallelism between the sphincter of the pylorus and the anal sphincter.

DR. GEORGE GOODHUE, Dayton, Ohio: The operation on my duodenal ulcer consisted in ligation of vessels running to the ulcer and a gastro-enterostomy ten days after a very severe hemorrhage. Perhaps I am prejudiced but I am in favor of that operation. Surely the mortality of 1.6 per cent. as compared with two out of eleven would seem to lead us to accept gastro-enterostomy as formerly done. For eight years prior to my hemorrhage I was aware of the possession of a duodenal ulcer but I hesitated in accepting an operation because foreign publications in regard to results were unfavorable and the Rochester Clinic had not published a very full report at that time. Their later report, if I remember correctly, shows that about 98 per cent. of operations for cure of duodenal ulcer by gastro-enterostomy give satisfactory results. It seems to me that with such a statement as that we should be inclined to follow the old method unless something else could be shown to be much superior. So far as my own personal condition is concerned, I am unaware of any operation having been done. The fluoroscope shows everything passing through the new opening and I think some of the faults which have led to disfavor in this operation consisted in making the opening too near the cardiac end, as pointed out by Hartmann of France. It should be made in the motor part of the stomach, the pyloric end. It strikes me that the operation as done at the Rochester Clinic and by most other surgeons is founded on a reasonable and scientific basis and should not be discarded too readily.

DR. JOHN J. GILBRIDE, Philadelphia: Relative to these cases of severe hemorrhage in duodenal ulcer I wish to call attention to an unusual situation of duodenal ulcer occasionally observed. A number of years ago I saw in a Philadelphia hospital a man who was suffering from severe hemorrhage from a duodenal ulcer. This man died before the operation from hemorrhage. At the necropsy on exposure of the upper abdomen there was no sign of lesion in the duodenum. However, on opening the duodenum the ulcer was found in the upper and inner wall. Of course, unless one had considerable confidence in his diagnosis this case surely would have been missed even at operation. With confidence that one is dealing with duodenal ulcer the thing to do would be, of course, to make an incision through the duodenum and expose the ulcer. In the case referred to a gastro-enterostomy would not have been life saving. Then, again, one would have to be quite certain of the anatomy to deal with the ulcer here owing to

the risk of occluding the common bile duct. In these cases, in speaking of the ligation of arteries for ulcer situated in other localities, of course, it would be perfectly obvious that it would be necessary in such a case as this one to ligate the duodenal branch of the gastroduodenalis artery and then do a gastro-enterostomy after closing the duodenal incision. Whether one would wish to deal with such an ulcer locally would be left to the individual operator. So far as I know such cases are not frequent. And this is the only case of which I have knowledge of an ulcer in this situation.

Dr. Albert J. Ochsner, Chicago: I wish to direct attention to a faulty premise which is introduced into every discussion of this subject. In experiments by Cannon and Blake the stomach of the healthy animals had the form needed to do its physiologic work. It is the business of the stomach to store a certain amount of food in one portion, grind it in another portion and deliver it through a normal pylorus. The diseased stomachs which we consider in these discussions have an accumulation of connective tissue and an obstruction in the

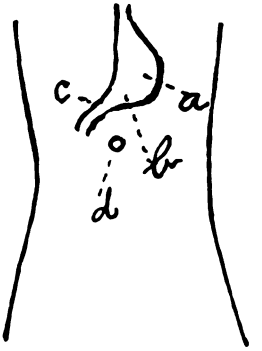

Fig. 1.—*a*, gastric pouch; *b*, pylorus; *c*, duodenum; *d*, umbilicus. The stomach outlet is at the lowest point in a normal stomach.

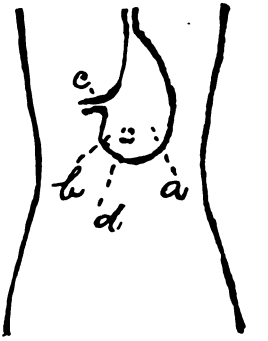

Fig. 2.—The position of these points is altered in the dilated stomach; hence the gastro-enterostomy opening is made between *a* and *b*.

region of the pylorus which produces an entirely different machine. When you make a gastro-enterostomy you permit the residual decomposed material to pass out of the pouch in the stomach into the duodenum. The conditions are entirely different from those in a normal stomach which could take care of its contents in a normal way. After that has happened, because there could no longer exist a quantity of residual material and you have given the musculature of the stomach time to resume its physiologic work, you make your observations again and find that the stomach walls are again doing their physiologic function in the old way.

DR. MILES F. PORTER, Fort Wayne, Ind.: Dr. Balfour said that not a few of these hemorrhages from the stomach and duodenum have their origin in toxic conditions elsewhere than in the stomach. He referred to the gallbladder, the pancreas and other organs as being possible sites of the process giving rise to toxic conditions. All of these points are worthy of emphasis. A further fact to which I would call attention is that given an individual who has, or has had, an ulcer of the stomach and has now the remains of it with the hemorrhage, it does not follow that the hemorrhage comes because of the ulcer. A patient came to me to be relieved of severe hemorrhage supposed to be due to a duodenal ulcer first diagnosed by me about fifteen years before. I did a posterior gastroenterostomy and found a small insignificant scar on the anterior aspect of the duodenum within half an inch of the pylorus. For a few days he had a rather stormy time, apparently from kidney insufficiency, but after that he made a prompt recovery. He went along nicely for a time and then had a sudden hemorrhage. He was referred to another clinic and the pyloric portion of his stomach was removed. The man made another recovery and came back home. He had another collapse and another hemorrhage, and this has been repeated several times. My point is that my diagnosis was correct. He did have a duodenal ulcer, but he was bleeding because he had an arterial condition largely the result of a chronic contracted kidney which I overlooked. I made a mistake when I did the operation on his stomach. My friend who operated afterward made another mistake. There is some way, perhaps, by which we might arrive at the correct conclusion in these cases. If there is I would like to know how to do it.

DR. WILLIAM J. MAYO, Rochester, Minn.: I am very much interested in the operation proposed by Dr. Horsley, because the last word has not been said concerning ulcers of the stomach, and the best procedures for getting rid of them. I think, however, that we should ask Dr. Horsley to come before us next year when he will have had an opportunity to perfect his technic. As Dr. Blake says, in order to test the method his technic should be followed exactly. I must say that the two deaths in his eleven cases made me a bit conservative, although, as Dr. Horsley has pointed out, both deaths were due to accidental causes that might be avoided in the future. I think there is opportunity for such an operation and I hope that Dr. Horsley will carry it to its logical conclusion. The old question of cure as the result of operation comes up. Let us bear in mind that ulcers of the stomach and duodenum as they are seen by the surgeon are chronic diseases that have been treated medically for years. I have been asked, "When does a chronic ulcer of the stomach or duodenum become surgical?" For various reasons the answer

has been: "After nine complete and perfect medical cures." With regard to the question of failure to cure surgically, I would put it down as a Hibernianism, that the first cause of failure is in doing an operation—gastro-enterostomy usually—on a patient who has no ulcer. We have records of having cut off more than 300 unnecessary gastro-enterostomies, closing the stomach and jejunum. These operations were done in cases in which there was no evidence either in the history or the condition found at the second operation that ulcer had existed. Fourteen of these were my own early cases. The most common cause of failure of operation to cure, when an ulcer really exists, is the use of silk as suture material which, in a certain percentage of cases, leads to secondary ulcer in the suture line. A very large majority of gastrojejunal ulcers (so-called jejunal) are due to ulcerations around silk sutures which cause the same symptoms as the original ulcer. In the course of time, in many instances, healing takes place as the silk passes out. Such cases are mostly responsible for the opinion that medical treatment is necessary after operation. In 1914 Dr. Charles H. Mayo stopped using silk. We all have now adopted catgut, and in more than 4,000 gastro-intestinal anastomoses of various kinds in the clinic there has not been a single instance in which catgut has failed to be satisfactory. Some of the gastrojejunal ulcers become chronic or complicated fistulas form between the colon, stomach, and jejunum. Regarding the excision by cautery and excision by knife: If an ulcer which is cancerous or is beginning to be cancerous is excised with the knife, cancerous cells may be grafted on the edges of the cut wall of the stomach. I have known this to happen so often that I am now afraid to cut into a cancer to take out a piece for microscopic examination, unless I remove the growth at once. I could report such unfortunate occurrences. We can say that there are three periods in the life of a normal cell, growth, function and senility. The malignant cell has but two periods, growth and senility; it has no period of function, but unfortunately it undergoes most active cell division in the embryonic stage. It has been shown that cancer cells are five times as vulnerable as the normal cells. If the cautery excision is used, cell division will be stopped at a distance beyond the actual excision.

DR. CHARLES A. L. REED, Cincinnati: When I heard Dr. Mayo say that the last word on this subject had not yet been spoken I was hopeful that he would speak it. Having listened to him I am still convinced that the last word has not been spoken; and I am quite sure that after I shall have concluded my remarks you, in turn, will say that the last word has not been spoken. The point to which I want to call attention is one which is of enormous importance in the pathology of this condition. Both the essayists called attention to the fact that in certain cases in which hemorrhage followed operation pre-

existing ptosis had remained uncorrected. I wish to call attention to the fact which has not been mentioned in either one of the papers that in every one of these cases in which this operation was done there was found the condition of extreme visceral cyanosis, a dammed back venous circulation, the primary effect of which is a gastric catarrh. With a general visceroptosis there will be, first, a general venous engorgement and, next, a resulting catarrhal condition of the duodenum and other portions of the alimentary tract, noticeably the colon. Then, as the back pressure in the veins increases to a certain point and the carbon dioxid content of the veins reaches a certain point, molecular death ensues in the follicles and the process of progressive ulceration is inaugurated. In the majority of these instances I am convinced, logically, although I am not able actually to demonstrate it, that these hemorrhages, preoperative and postoperative, are derived in whole or in part from the venous side of the circulation. Therefore, if you have a persistence of the ptosis which causes the venous engorgement and a persistence of the venous engorgement which causes the hemorrhage, you necessarily have a recurrence of the hemorrhage and a persistence of the ulcer. You have such general persistence of both these conditions simply because you have not eliminated the cause, or, in other words, the underlying pathologic factor in the venous circulation. I have been convinced of the importance of this angle of view by repeated experiences, and I find that in so far as I control and restore the venous circulation my recoveries are permanent, and that in so far as I fail to do this, my recoveries are uncertain, to say the least.

Dr. Donald C. Balfour, Rochester, Minn.: Ligation of vessels should always be considered when hemorrhage has occurred. Dr. Strauss makes a plea for excision alone in gastric ulcer. We have so frequently seen patients who have failed to secure relief from symptoms by excision alone, that we now always combine gastro-enterostomy with excision. Regarding excision by the knife or by cautery, Dr. W. J. Mayo has left nothing to be said, but I think the fact should be emphasized that experience with the cautery in malignancy shows that the cautery effectually destroys any cancer cells which may be in the ulcer base, and that knife excision of an ulcer which has undergone early malignant change is always associated with the danger of cancer cells grafting. The danger is avoided in cautery excision. In regard to the best operation in benign lesions of stomach and duodenum, any effort to establish a certain operation as a routine operation in such lesions is inadvisable, and it is only by making use of the various types of operations which have been devised that the surgeon will secure the best results.

Dr. J. Shelton Horsley, Richmond, Va.: The first death was due to hemorrhage from an ulcer in the cardiac portion of

the posterior wall of the stomach. In the excision of this ulcer I did an intragastric incision and tied the mattress sutures too tightly in the mucosa of the stomach where the ulcer was excised. The second death was due to the fact that I cut too deeply. Here I am quite sure there would have been no occasion for secondary hemorrhage had I confined the incision to the scar tissue. It is hardly fair to condemn an operation because of two deaths of that character or to compare the mortality of a new procedure with that of a standardized operation such as gastro-enterostomy. Excluding stenosis and gastric ulcer, my mortality in duodenal ulcer is *nil*. I am doing the operation only because I believe I can get better results for my patients by this procedure. In treating ulcer in ano it is essential, after getting rid of the pathology, to obtain physiologic rest by eliminating or diminishing the function of the sphincter. In this operation we cut the pyloric end of the stomach for the same reason. Excision of the ulcer alone is not effectual. We incise at the region of greatest contraction and so give physiologic rest. I have used catgut throughout, following the suggestion of the Mayo Clinic. Dr. Ochsner said the stomachs in which operation for ulcer is done are dilated. This is because of obstruction or pyloric spasm, and if you remove the obstruction as advocated in this pyloroplasty you decrease the burden of the stomach in emptying its contents and it returns to the physiologic norm. The facts are that in this pyloroplasty the pathology is excised or corrected, the tissues are put at physiologic rest during healing which is a first principle in all surgery, and the stomach is returned to its normal function. In gastro-enterostomy, even if one closes the pylorus, it opens and a portion of the food goes over the ulcer, so but little rest is afforded; the ulcer is often not removed; and the stomach function is anything but physiologic.

TREATMENT OF GUNSHOT WOUNDS OF THE ABDOMEN

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In the treatment of gunshot wounds generally, the last five years have witnessed great change and great improvement. In the treatment of gunshot wounds of the chest and of joints the advance has been most striking and will greatly change the civil practice in these fields; but in abdominal surgery it cannot be said that any wonderful change or improvement has been made. Because of the great prevalence of shell wounds over those made by high velocity bullets, operation in these cases has been much more regularly resorted to than, for instance, at the end of the Boer War. During that war it was undoubtedly true that patients did recover after penetrating and perforating wounds of the abdomen; but I cannot say that I saw in nineteen months spent in advanced and base hospitals a single instance of this kind.

In a communication of this length it is impossible to go deeply into the literature of the subject or to give extensive tables of statistics, even if this were desirable, and I shall confine myself to personal experience and observation.

NEEDLESS ABDOMINAL EXPLORATION

One of the most important things in the treatment of gunshot wounds of the abdomen is the ability to estimate fairly accurately whether the missile has really penetrated the abdominal cavity, and if so what structures have probably been damaged. This may not at first thought appear to be of the prime importance that it is, for one may say it is safer to open the abdomen in

any case and determine whether penetration has occurred and what viscera, if any, have been injured. But, taking a large number of cases, this is not true; for one would find himself doing an exploratory laparotomy many times when there was no penetration; when the injured viscus, such as the liver, were better undisturbed; when the injury was above and not below the diaphragm, and in many cases in which the patient had multiple wounds and the prolonged negative exploration only added to the risk of life.

If a man has, for instance, a compound fracture of the leg or thigh, and perhaps a number of wounds of less severity, one should be very sure that a wound which would seem to have involved the abdomen really entered it before subjecting the patient to a deliberate abdominal section and a prolonged search for injury of the viscera; the other wounds alone render this case a serious one, and their treatment must require considerable time and involve a prolonged anesthesia. I do not mean, of course, to say that the abdominal wounds are not the most serious, or that they do not demand first consideration; but I would suggest that here, as in civil practice, one has no right to subject a patient to a needless abdominal exploration, especially when care and the exercise of judgment may show that such an operation is unnecessary. Numerous instances illustrating these points must come to the minds of many, and a common observation has been that many wounds which would certainly seem to have involved the abdomen were only wounds of its wall, and that others which were small and seemed trivial at first sight did involve the abdominal viscera.

VARIOUS TYPES OF WOUNDS

A common type of wound of the wall which produced shock and abdominal rigidity was that caused by a shell fragment and characterized by a large ragged wound of entrance, probably by a larger one of exit, by extensive ecchymosis, by marked abdominal

rigidity, and by costal breathing. In such cases the wound should be excised or débrided and the abdomen should not be opened deliberately at some point of election until penetration has been definitely determined. It is needless to say that probing should never be done. The probe, in fact, should be eliminated from the paraphernalia of the military surgeon. I have seen a number of small and apparently trivial wounds, of the loin and lumbar region particularly, in which either a careful examination or time would show that the missile had penetrated the abdomen. I recall seeing a young officer, being treated for gas poisoning of slight degree in a field hospital, who made very light of a small wound in the left loin; but examination made one suspicious of abdominal penetration, and a few hours later, when he had been transferred to an evacuation hospital and operated on, the suspicion became a certainty.

It can truly be said, then, that to lay down definite rules for action in these cases is difficult, and that experience and judgment, and above all a careful examination of each case, are of prime importance.

Many more lives are lost in this field by "not wasting time in trying to make a diagnosis" and operating at once than by wasting the time in study of the case. It is not so much a question of diagnosis as of determining whether or not the abdomen should be opened. In this connection there comes to mind that interesting group of combined chest and abdominal wounds—perforations of the diaphragm—in which the surgeon probably has the greatest difficulty in determining his action. It is surprising in how many cases of gunshot wound of the lower chest or those in which a missile lies in or on the diaphragm, the patient will present symptoms which would certainly suggest an abdominal penetration: particularly abdominal rigidity, sometimes later abdominal distention, and frequently hiccup. I can recall six such cases in one evacuation hospital last summer, in any one of which operation might have

seemed justified, but in which all six patients recovered without operation.

Still another type of these combined chest and abdominal wounds was that in which the missile penetrates the abdominal wall, perforates the liver and diaphragm, and lodges in the thorax. If the injury is confined to the structures mentioned, and the missile, as disclosed by roentgenoscopy, is not large, no immediate operation should be performed; but the question always came up as to the possibility of injury of the colon or stomach. The probable course of the missile, as indicated by its point of entrance and its location, was of the greatest help in many of these cases. My own rule was not to operate unless there was present a pretty definite indication of injury of a hollow viscus. The wound of the liver and diaphragm alone, except when made by a large foreign body or accompanied by a sucking wound of the chest, was not considered as calling for an immediate operation. I have often regretted operating and suggesting operation in these cases, but I cannot recall a single case in which I regret not having operated or recommending such a course. The situation here can be summarized by saying that if one is fairly certain that the hollow viscera have escaped injury, no operation should be done.

What about hemorrhage? In cases of hemorrhage from the liver caused by gunshot wounds a few patients are saved by operation, many are not benefited, and not a few are made worse. I believe that nature is more likely to stop bleeding from a gunshot wound passing through the liver than is the surgeon. In some of these cases the missile has injured the kidney as well as the liver and diaphragm, and here the hemorrhage can and should be controlled, or the kidney removed.

TECHNIC

In regard to the technic of abdominal operations I think there is little to be said, for the war has, I believe, brought about no important changes. Perhaps an

exception to this statement can be made in regard to drainage. The rule of closing the abdomen without drainage became established by our allies early in the war, and I believe is a good rule. The war has certainly shown that drainage of any wound is a frequent cause of its infection, and the discontinuance of the abdominal drain represented the application of this general rule to abdominal cases. There are, however, many cases, especially of wounds involving the large intestine and bladder, in which it would have been foolish not to drain.

An observation which I made, after a few months' service in a British base hospital in France, was that although many men with gunshot wounds of the abdomen were admitted in good condition a week or ten days after operation, yet a number of them later developed an infection of the wound and it had to be laid wide open. This occurred so often that later in my own work at a British clearing station I followed the plan in every instance in which evacuation was necessary within ten days—and this was true in most cases—of closing all the layers of the abdominal wall excepting the skin and placing sutures through the skin which could be tied later, if no infection occurred. I learned from Brewer that he had reached the same conclusion and followed the same practice. These late infections, I believ occurred from the skin, and they were also frequently seen after complete closure of the chest and knee-joint wounds. Of course, in the latter two situations it is much more difficult to close off the cavity thoroughly, without closure of the skin, than it is in the case of abdominal wounds. I am sure from my personal experience that the late closure of the skin prevented an infection in many cases. It is true that the late infection of the abdominal wound practically never gave rise to an infection of the peritoneal cavity, whereas such an infection in a chest wound or in a wound of the knee-joint almost invariably resulted in

an infection of the underlying cavity. My impression is that when an abdominal drain is employed, it should be a loose gauze drain covered with rubber dam or rubber tissue. The hard, rigid, rubber tubing, or uncovered gauze drains are much more apt to give rise to dense adhesions, which may later produce obstruction or, by pressure, necrosis.

MORTALITY

The mortality in gunshot wounds of the abdomen was extremely high, and a large proportion of this mortality occurred on the field or before the patient reached an advanced operating center, and hemorrhage and shock were its two most potent causes. But the mortality in those cases in which the wounded did reach the operating center was also high, largely for the same reasons, but often because the patient suffered from multiple wounds, the repair of which meant prolonged anesthesia and increased shock. From what I have seen of the late results, I should say that the mortality was not so high as might be expected from late complications in the case of those who recovered from the primary effects of their wound and the operation.

A common observation was that the prisoners with abdominal wounds seemed to stand operation better than our own soldiers, and that the mortality among them was not so high. This, I believe, was due to the fact that they were not operated on with the promptness, I may say haste, that was exercised in the case of our own men. If this observation is correct, the inference is obvious: that it is a mistake to operate on gunshot wounds of the abdomen until the patient has recovered from the shock sufficiently to stand operation, unless the shock is due to hemorrhage. To determine whether the shock is due to hemorrhage was, in many instances, very difficult; but when it was not due to hemorrhage, much better operative results were

obtained by waiting. All of the patients, of course, have lost a certain amount of blood; and the important question to decide is whether the bleeding is continuing. One cannot resort to exploratory laparotomy with the same impunity that he would in civil life, because in most instances the patient is suffering from more than one wound, and the operation, which is indicated, must of necessity occupy a much longer period of time and necessitate the employment of a much larger quantity of the anesthetic agent, two factors which largely increase the immediate operative mortality.

ABSTRACT OF DISCUSSION

DR. EDWARD W. MEREDITH, Pittsburgh: In the case of patients arriving with abdominal wounds which seemed to have penetrated the peritoneum we were able, on account of the absence of rigidity, vomiting and because of the generally good condition of the patient, to say that this patient did not have a penetrating wound of the abdominal cavity. This gave us an opportunity to operate on the wounded men most in need of immediate attention, and to leave the treatment of other patients for a more convenient time. The average time of arrival of patients after injury was twenty hours. In cases in which a hollow viscus was penetrated the question was that of diagnosing peritonitis. We did have abdominal rigidity, some distention and some rise in pulse rate, in addition to the rise that might come from hemorrhage, to aid us in diagnosis. The surgical proposition, therefore, was that of treatment of peritonitis. In none of these cases, except a case of ruptured spleen, was there any question of serious hemorrhage. Four patients with wounds of the chest and abdomen were operated on; two patients had a ruptured spleen; one patient had a ruptured kidney; the fourth patient showed no visceral lesions. The two patients with ruptured spleen died from preoperative and postoperative hemorrhage. All patients were placed in the shock ward, both for observation and resuscitation. After a long ambulance ride, with more or less exposure to cold, with pain and loss of fluids they arrived in a much shocked condition and with depressed vitality. After two or three hours rest in a warm bed there was usually considerable improvement, if anything could be done. Perhaps we used drainage more than Dr. Gibbon did. We found it necessary to drain in 30 per cent. of the cases. The abdominal wall was sutured, with the exception of the skin—following the general rule laid down in the A. E. F. not to suture the skin. We did, however, suture the remaining layers of the abdominal wall. The chest cases in which

it was possible that there might be combined abdominal injury were treated conservatively as were all chest cases in our hospital. In wounds of the lower chest wall, in which abdominal distention might be expected, we followed the same rule of depending on rigidity of the abdomen to determine whether an operation should be done. If we could satisfy ourselves that no abdominal hollow viscus had been injured we followed the conservative plan as in the straight chest cases. The difference between military and civilian surgery in cases of wounds of the abdomen is not great. We have nothing special to offer in improved technic in the operation itself. We were handicapped, of course, by the lateness of the patient's arrival. In civilian life this interval would certainly be less than twenty hours. We were handicapped also at times by the rush of patients, and by questioning whether it was advisable to operate in some of the more serious abdominal cases or to operate first on patients who were more lightly injured that they might be restored more quickly. We did not refuse any patient an operation because of the seriousness of his condition. The larger percentage of patients arriving in our hospital reached there in fair condition. Outside of the difference in time of seeing the patient after injury there is little difference between military and civilian surgery.

RATIONAL SURGERY OF VISCEROPTOSIS

ROLAND HAZEN, M.D.
PARIS, ILL.

This paper is based on observation and treatment of many nonoperative cases of visceroptosis, and on careful examination within the abdomen and operation for its cure in 116 cases. After-results are based on questionnaire returns from eighty-five patients, who were operated on more than one year ago. The first operation was performed eight and a half years ago.[1]

It is generally accepted that the most rational plan of relief for visceroptosis consists in its treatment by means of belts, postures, calisthenics and fattening. There are cases, however, which under the most painstaking attention to these principles fail to respond in a satisfactory degree. It is only in such cases that the assistance of surgery should be employed.

That the origin of the fundamental defects in the vast majority of these cases is congenital is generally accepted. In our series, 96 per cent. were of the congenital type, the defects consisting primarily in a faulty fusion of the peritoneum of the back with that of the ascending colon, hepatic flexure, and less often, of the splenic flexure and descending colon.

The effects of faulty fusion may be considered under: (1) abnormalities in the position and relation of the viscera, and (2) abnormalities in the retaining and supporting structures of the viscera.

ABNORMALITIES IN THE POSITION AND RELATION OF THE VISCERA

Various surgical operations have been advocated for the suspending of the stomach, transverse colon, cecum, liver and movable kidney. These operations are per-

1. A preliminary report was read before the Illinois State Medical Association, and published in the Illinois Medical Journal in December, 1912.

formed singly, or two or more of them may be performed in the same case. The results of these procedures, while excellent in some cases, have not been uniformly satisfactory. The changes in the position and in the attachments of the abdominal viscera which result from malfusion are extremely complex and varied; and any single operation, performed without consideration of its effect on the abnormal conditions of the other organs, can scarcely be expected to give uniformly good results.

Rational surgery should take into account the methods of attachment, and the relations of static equilibrium of the abdominal viscera one to another, as found in the normal subject, and, as far as possible, should replace and rebuild the ptosis subject, by inducing fusion at the back of the bowel, where fusion should originally have occurred.

In comparing the normal with the ptosis subject, we find many interesting differences, the relative importance of which have not been sufficiently emphasized. It is my object here to show that the position of the hepatic flexure is the vital point, and constitutes the key to the situation. If the hepatic flexure is permitted to come downward, forward or inward, out of its housing beneath the liver, secondary changes will necessarily follow in the position of the other viscera, constituting visceroptosis.

The pertinent points in the normal anatomy are as follows: The colon is firmly and evenly fused in the depths of the flanks on both sides, and the flexures, found lying posteriorly on the kidneys, make an easy turn in passing forward to the transverse colon. The hepatic flexure mounts up well under the liver. The transverse colon, suspended as a festoon from the flexures, is provided with a mesocolon, permitting it to vary its position, to compensate for gas distention of the stomach or intestine. The stomach has two fixed points, at the cardiac and pyloric ends, the body of the stomach being suspended as a bag, between these

points. The stomach and the liver occupy the space beneath the costal margins. The main axis of the stomach passes in the direction of an obliquity of about 45 degrees. The axis of the liver is nearly horizontal.

If the hepatic flexure comes out of its position under the liver (Fig. 1), a vacancy results in the upper abdomen. As a consequence, the costal margins collapse, the liver rotating inward or forward to occupy this space. The axis of the liver now assumes an oblique direction. If the kidney also prolapses, the liver rotation is further exaggerated.

The inward rotation of the liver carries with it the pyloric end of the stomach, which now assumes a position near the median line at a much lower level than formerly. The main axis of the stomach is now nearly vertical. If the splenic flexure also prolapses, this change in the stomach axis is exaggerated.

With the descent of the flexures, there is also a forward displacement, which lessens the distance between the ends of the transverse colon, permitting it to sag, and thus exaggerating its descent. The transverse colon often loses its sacculations, owing to atony of the longitudinal muscle bands, and is thereby actually elongated.

It is evident, thus, that if the liver is lifted and the flexures are now replaced in the upper abdomen, deep in the flanks, and under the liver and stomach, and retained there, the liver and stomach rotation will be prevented. The pyloric outlet of the stomach will be elevated and brought further to the right, and the span of the transverse colon will be lengthened and will again hang as a festoon between the two upright fixed portions of the colon.

ABNORMALITIES IN THE RETAINING AND SUPPORTING STRUCTURES

The finding by roentgen ray or otherwise, as in Figure 2, may mean much or little. The patient may enjoy perfect health or may be an invalid. This

depends on whether the malfusion is so formed as to afford easy, uniform and regular support, throughout the length of the colon, in its faulty position; or whether the support is irregular, holding under local tension at one point, with marked slackness at other points, thus producing local traction strains as in Figure 3.

Here we see the cecum and part of the ascending colon in normal position. There are two small but firm bands of adhesion at the bend of the ascending colon, one passing beyond the longitudinal muscle bundle, and so placed as to produce an angulation, and to take the strain of bearing part of the weight of the upper half of the ascending colon. The hepatic flexure is downward and inward, and rather evenly supported by a fairly uniform, but very long mesocolon. The end of the hepatic flexure, and beginning of the transverse colon, is supported in an angulated position by a large, firm band, attached to the gallbladder and to the liver. The effects of physical exertion, producing traction strain, on the gallbladder and bile ducts, as well as on the colon, in this case are evident.

This demonstrates the principle that irregular areas of fusion, or adhesion formation, associated with areas of lax attachment elsewhere, will necessarily throw a strain at the points of attachment, and produce symptoms referable to both ends of these adhesions. Therefore, in dealing with visceroptosis, we must, from the outset, visualize the condition, as one of malfusion and irregular tissue strains; to see it from the back, as it were, and to consider in what manner the bowel is held, in whatever position it is found, and what damage these holding strands are doing, rather than to see it in relation to the degree of actual elevation or descent of the viscera.

It is of importance to recall that in the embryo, at the fourth month, the following events have occurred: The descending colon has assumed its normal position

in the flank, and fusion has already taken place. The cecum has migrated to a position under the liver, and is in close relation to the duodenum, the pylorus and the gallbladder. The duodenum, at this time, has made its twist, and is becoming fused with the peritoneum of the back. Not until after birth has the cecum migrated to its permanent position, and the ascending colon become fused.

We should naturally expect, from the above, that areas of fusion will be most frequently encountered in the region of the hepatic flexure, the duodenum, the pylorus and the gallbladder, and in the region of the cecum and ascending colon. Many studies of the latter have been published in connection with the so-called "Lane kink" and "Jackson's membrane." There have also been many observations of peculiar adhesion formations about the gallbladder, presumably resulting from gallbladder infection.

In our series of patients operated on, we found irregular and abnormal adhesions, not associated with gallbladder, in the region of the hepatic flexure, in 67 per cent. of the cases, as compared with adhesions of the ascending colon in 53 per cent. of the cases. Harvey[2] found, on postmortem examination of 105 newborn children, thirty cases of adhesion in the upper region, and thirty cases in the lower region. It is evident, therefore, that the importance of the hepatic flexure, in relation to its irregularities of attachment, is equal to, if not greater than, that of the cecum and the ascending colon. When we consider the consequences of irregular traction strain, in the region of the hepatic flexure, involving the duodenum, the pylorus, the gallbladder and the liver, it is readily seen that this neglected portion of the colon has a significance far exceeding that of any other portion of the viscera; and many of the obscurer phases of the symptomatology of visceroptosis are hereby explained.

2. Harvey, S. C.: Ann. Surg. **58**: 641 (June) 1918.

CLINICAL TYPES

While the symptomatology of visceroptosis seems to be complex and indefinite, and correct pathologic diagnoses are infrequently made by the profession at large, these patients usually present one of four clinical types, which are in direct relation to the location of the adhesion bands producing traction strain. These types simulate:

1. Chronic appendicitis or ovarian trouble.
2. Affections of the liver or gallbladder.
3. Ulcer of the stomach or duodenum or cancer of the stomach.
4. Neurasthenia and general physical asthenia and intestinal toxemia.

There are, however, certain characteristic symptoms which distinguish these cases and which may have to be brought out by inquiry, namely:

1. Onset, gradual and progressive.
2. Jolting pains. Riding in an automobile is accompanied by soreness, lameness, and a dragging sensation in the abdomen and flank.
3. Exertion pains. Sweeping, lifting or any slight, undue exertion will be followed, perhaps not until the next day, by an aggravation of symptoms, whether it be the dull, dragging pain in the appendix or ovarian region, or the gallbladder or the kidney region, or the vomiting, which is persistent and without relation to the kind of food taken, and without much nausea.
4. Characteristic postions in bed. There are certain positions that cannot be tolerated, on account of a pulling sensation. Lying on one side or the other, or lying straight out, will produce this discomfort.
5. Fatigue, easily acquired. These patients are usually run down, and easily exhausted, but are temporarily relieved after confinement to bed from any cause.
6. Color, sallow or muddy, and tissues atonic.

In an instance of localized fusion just above the cecum, the illustration of which is not reproduced here, the hepatic flexure is entirely free and looping forward, although its highest point is fairly high. It is retained by an adhesion band to the stomach and to the duodenum, indenting the latter and finally running up to the gallbladder. The transverse colon sags downward, being suspended by the latter bands and at its other end by a band of adhesions passing from the splenic flexure to the spleen. Agitation of the loose portions of this colon, through exertion, may cause traction strain on the adhesions, so as to produce symptoms of any one or all of the clinical types above mentioned.

Figure 4 shows the cecum prolapsed over the brim of the pelvis, and a broad, fairly uniform mesocolon for the ascending colon, and two restraining bands from the hepatic flexure, one to the pylorus and the other to the gallbladder. There is also a band from the splenic flexure to the left flank and spleen.

REPORT OF A CASE

CASE 11.—Mrs. H. H. P., aged 39, had suffered for twenty-five years from fatigue, jolting, and dragging pains throughout the abdomen, and occasionally in the splenic region. Moderate exertion would cause physical incapacity for several days at a time. For ten years she had been totally incapacitated for housework; for six years, attacks of persistent vomiting had followed any moderate exertion. During the previous year her condition had been deplorable. She was a woman of intelligence, and had consulted many physicians, and had received many diagnoses and but little benefit. When she first consulted me, she had just completed a course in bed, with treatment for gastric ulcer. Her symptoms were better in bed but returned as soon as she got up. She was thirty pounds below her best weight, and extremely anemic.

Under rest, postural and supporting treatment, for six months, she managed to retain enough nourishment to gain a few pounds in weight, and her hemoglobin increased from 55 to 70. She had not gained any during the past two months. As she had thus evidently reached her maximum improvement, an operation was performed for the cure of her visceroptosis. The following conditions were found:

Ptosis of the entire right side of the colon was present. The cecum was in the pelvis, being retained by a band of adhesions, 1 inch wide, extending from the front of the ascending colon to the flank. The hepatic flexure was supported by a span of adhesions, suspending it from the pylorus and duodenum. The hepatic flexure was kinked by a band of adhesions, uniting it to the transverse colon.

The splenic flexure was suspended by a band of adhesions, attached to the spleen and to the left flank. On division of these restraining bands, the hepatic flexure and the ascending colon showed a mesocolon 6 inches in width, permitting a very free range of motion. The hepatic flexure could be laid on the normal region of the splenic flexure, without traction. The technic described below was employed for the correction of the ptosis in this case.

This patient made an eventful recovery, has not vomited since the operation, which was performed five years ago, and gained 35 pounds in weight during the first seven months, and retains this weight now. She does all her housework and is 100 per cent. physically efficient. She enjoys better health than she had ever known before the operation.

TECHNIC OF THE OPERATION

1. *Repair of Primary Defects.*—The abdomen is opened in the median line, and a thorough inspection is made of the position of the viscera and the location of the adhesions. The colon is lifted out by intestinal forceps, which grasp the anterior longitudinal muscle bundle, and it is systematically inspected for loose attachments and for irregularities, in the formation of restraining bands of adhesions, and the finer strands of restraining fasciculi. This inspection starts at the cecum, and passes up to the region of the kidneys, the gallbladder and the stomach, and is assisted with the palpating finger, passed along the outer aspect to the colon attachments. The splenic flexure and the descending colon are likewise inspected.

Adhesion bands are divided, when found to be harmful, and the colon is always freed of any constricting bands that pass over the anterior longitudinal muscle bundle, at any point.

Figure 5 shows the ascending colon and the hepatic flexure freed of adhesion bands, and its mesocolon, which contains numerous fibrous fasciculi, held in posi-

tion ready for the application of the sutures which are to replace it and induce proper fusion in the flank.

Figure 6 shows a number of parallel sutures introduced into the mesocolon, beginning at the cecum. The needle at no place enters the bowel wall itself, but picks up the mesocolon close to the bowel. Thence, the needle is reintroduced several times, picking up all the fibrous fasciculi possible until the posterior wall of the flank is reached. At this point, a deep stitch is taken, which must include the firm iliac fascia below and the lumbar fascia above. The capsule of the kidney is included in the stitch coming from the beginning of the hepatic flexure. This stitch starts the forward turn of the flexure. When these sutures are tied, the bowel will be firmly, evenly and uniformly attached to the flank.

In order to insure an easy, forward and inward curve to the hepatic flexure, a suture is now inserted in the edge of the gastrocolic omentum, and thence into the lateral abdominal wall, just beneath the edge of the liver. Similar sutures are placed at the splenic flexure, and descending colon, if needed. This completes the repair of the primary and fundamental defects, as it secures the uniform and even attachment of the portions of the bowel that normally should be fused to the back.

It is an advantage, also, to take up any slackness of the transverse colon that may remain by plication sutures in its mesocolon, or to suspend the transverse colon by the hammock operation of Coffee, as this makes for better retention, in case of vomiting, and also assists in retaining the position of the stomach.

Figure 7 shows the position of the posterior stitches after tying, and of the gastrocolic and omental sutures, ready to be attached to the abdominal wall.

Figure 8 shows the completion of the operation, with the stitches in place. Notice the posterior slant of the flank, and the colon lying firmly and evenly attached.

The hepatic flexure now lies well back and high up under the liver, and curves smoothly and evenly over the lower pole of the kidney and duodenum as it passes forward and inward, to become the transverse colon, which is now seen in its normal position.

2. *Repair of Secondary Defects.*—If the transverse colon is atonic and much elongated, with the obliteration of its sacculations (Fig. 9), fine silk intestinal sutures may be inserted at intervals in the longitudinal muscle band, in such a manner, that on tying them, this band will be shortened by 2 inches with each stitch, with a reproduction of the sacculations.

Forward and downward rotation of the liver may be remedied by placing two mattress sutures through the lower border of the liver, suspending it to the anterior abdominal wall.

Undue relaxation of the stomach may call for suspension, preferably by the operation of Rovsing.

Ptosis of the kidney can be repaired from within the abdomen by obliterating the opening in its capsule, through which its lower pole must descend and turn inward as it comes down. A deep suture on a large needle is passed through the peritoneum backward, close to the inner side of the lower pole of the kidney, down to and including the lumbar fascia, then outward and forward, close to the outer side of the lower pole of the kidney, and emerging from the peritoneum. On tying this suture, the opening in the capsule of the kidney is obliterated and, the kidney having been well replaced before applying the suture, the strands of the nephrocolic ligament of Longyear are secured to the lumbar fascia. This also aids in maintaining the proper position of the ascending colon.

RESULTS OF OPERATION

The typical roentgen-ray findings, before and after operation, are well illustrated in a case as follows: Figure 10 shows the colon before operation, in which

is seen a sharp angulation, ptosis, and filling defects, at both flexures, also marked ptosis of the transverse colon. Figure 11 shows the roentgen-ray examination of this colon one year after operation. The entire colon is seen to be in good position, with a free, smooth and easy turn at both flexures, absence of angulation, or filling defects, and good position of the transverse colon.

The stomach of this patient (Fig. 12) before operation is very low, and its outlet is in the median line. The examination of this stomach one year after operation (Fig. 13) shows it to be up in good position, and the pyloric outlet is located to the right, as it should be. This patient has enjoyed a complete symptomatic cure.

The changes in bodily poise and outline following operation are well illustrated in the photographs of Case 11. Figure 14 shows the front view, before operation, three weeks after operation, and seven months after operation. Collapse of the right costal margin is marked before operation, but has practically disappeared since the operation. The costal angle shows a decided widening after operation. The appearance of fulness in the upper abdomen, as well as the gain in weight, compared with the view before operation, is most striking.

Figure 15 shows the oblique position of the same patient (Case 11) at the same periods as in Figure 14; namely, before operation, three weeks after, and seven months after operation. We note here a decided change in the posture, or poise, from that of the typical enteroptotic habitus before the operation to that of the military poise after operation.

The profile view (Fig. 16) shows a marked constriction of the upper abdomen before operation, and the prominence of the lower abdomen is low, opposite the spine of the ilium. After operation, the constriction of the upper abdomen has disappeared, and the prominence of the lower abdomen is at a much higher level.

QUESTIONNAIRE REPORTS

The maximum benefits derived from this operation are tardy in attainment, owing first to the fact that these patients have been ill and below par for many years before operation, and, second, to the fact that the upper abdominal cavity has become constricted on account of the collapse and rotation of the liver and stomach. The replacement of the organs into the upper abdominal cavity necessitates a readjustment of the muscles controlling this region to meet the space demands of the replacement. During this period of readjustment, which lasts for a year or more, the patients occasionally complain of return of symptoms. These symptoms, however, gradually become less frequent, and finally disappear.

A questionnaire covering general improvement, as well as many details, was sent out to all patients whose operation had been performed more than a year ago, with the results as shown in Table 1.

TABLE 1.—QUESTIONNAIRE REPORTS

	No. of Patients
Questionnaires returned	63
Verbal reports from family physician	14
Total number of patients heard from	77
Questionnaires not returned	2
Deaths	6
Total number of operations since which over one year has elapsed	85

Eighty-eight per cent. of the patients report a gain in weight since operation. While seven patients report loss in weight, this loss was due chiefly to other illnesses. The net results of sixty patients who reported their weights show an average gain for the entire group of 15⅓ pounds per patient. One half of these patients gained an average of 14 pounds over their best former weight. This gain in weight is a striking evidence of the improvement that has occurred in this group, as a whole.

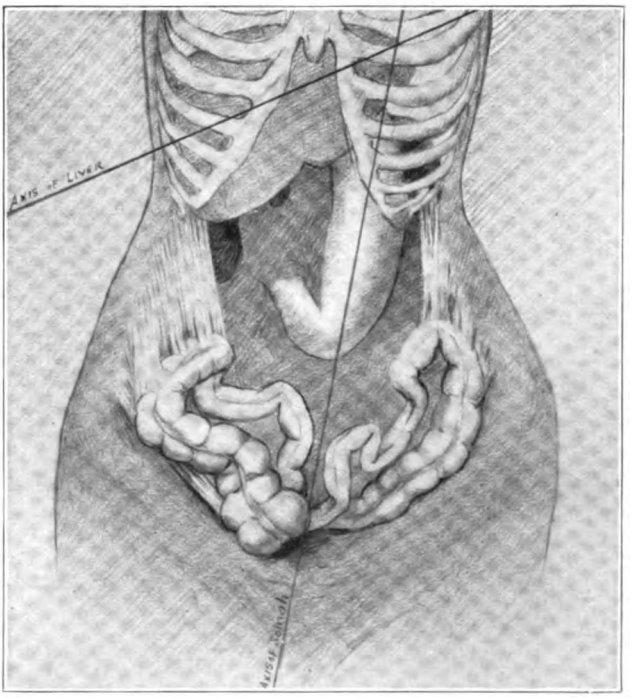

Fig. 1.—The main axis of the normal stomach passes in the direction of an obliquity of about 45 degrees. The axis of the liver is nearly horizontal.

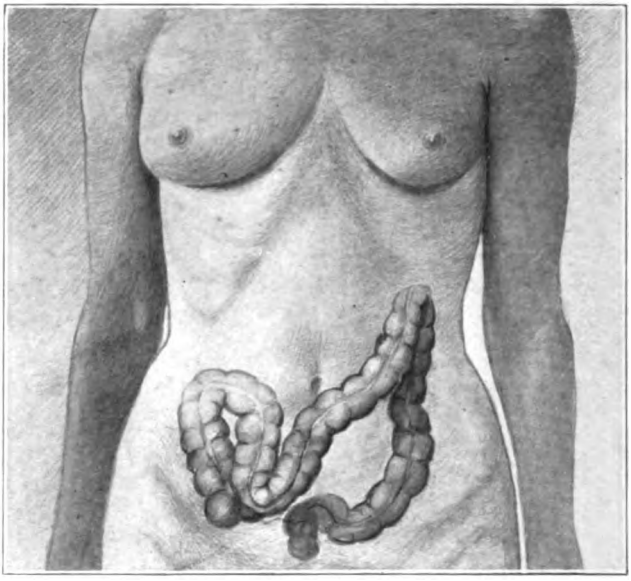

Fig. 2.—The span of the transverse colon when prolapsed hangs as a festoon between the upright fixed portions of the colon.

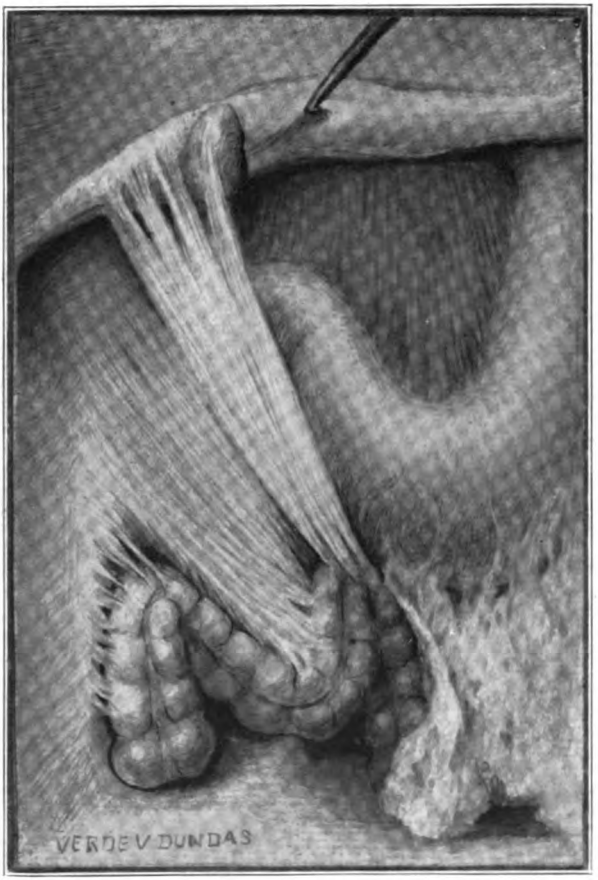

Fig. 3.—The cecum and part of the ascending colon are in normal position. The misplaced colon is supported partly by two bands of adhesions. The effects of physical exertion can be imagined.

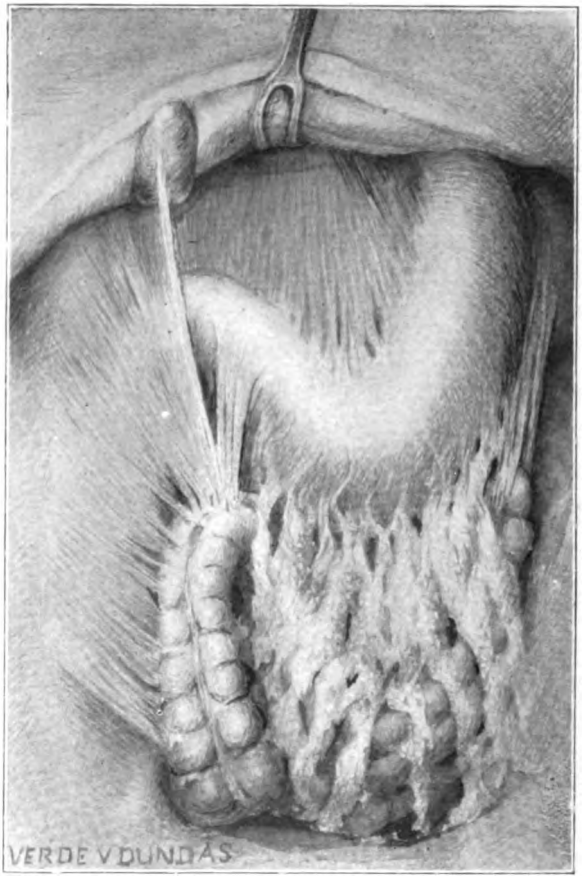

Fig. 4.—The cecum is prolapsed over the brim of the pelvis. There are two bands of adhesions passing down to the hepatic flexure, one coming from the pylorus, the other from the gallbladder.

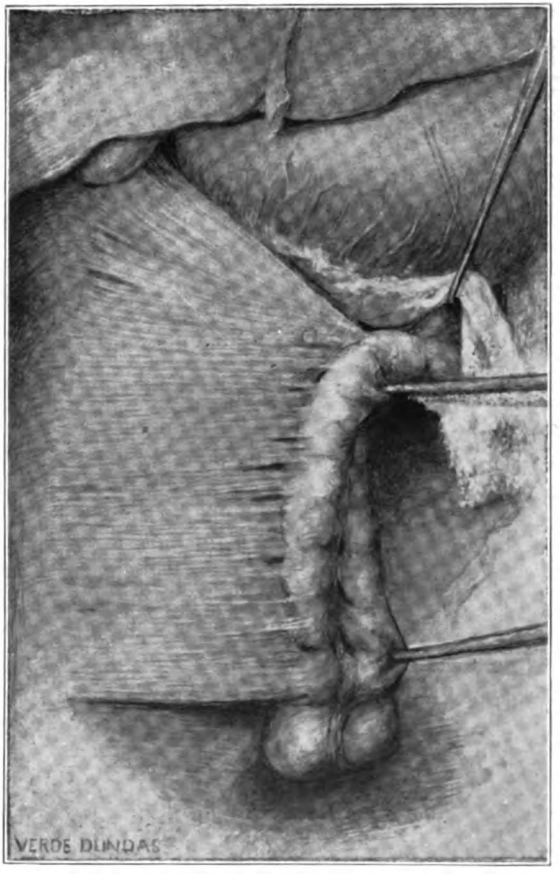

Fig. 5.—The adhesion bands have been divided and the mesocolon is held in position for the application of sutures.

Fig. 6.- Sutures have been introduced into the mesocolon in parallel rows.

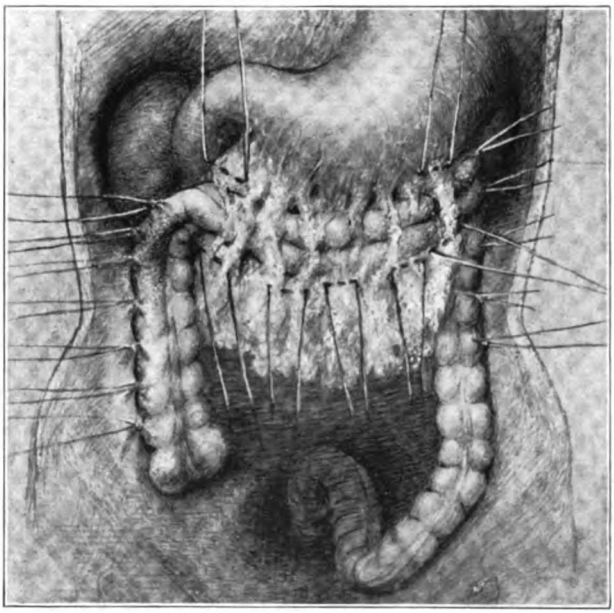

Fig. 7.—Position of posterior sutures after tying; the gastrocolic and omental sutures are ready to be attached to the abdominal wall.

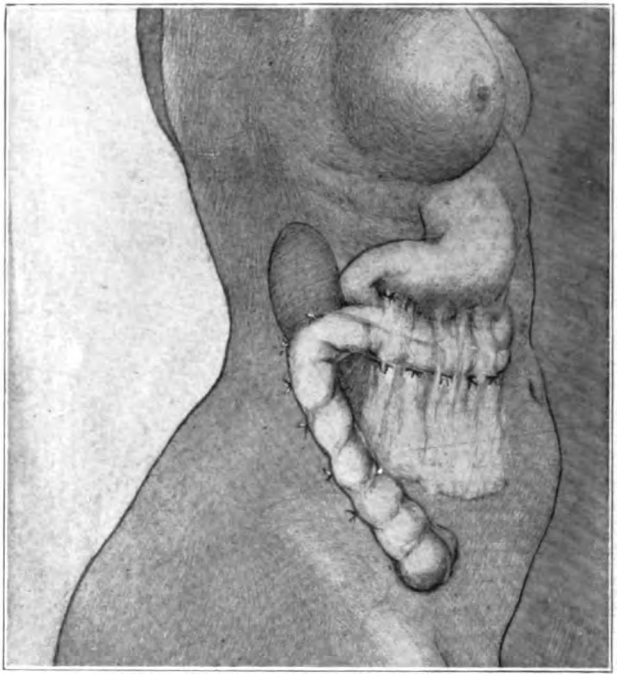

Fig. 8.—All the sutures are placed and tied and the operation is completed.

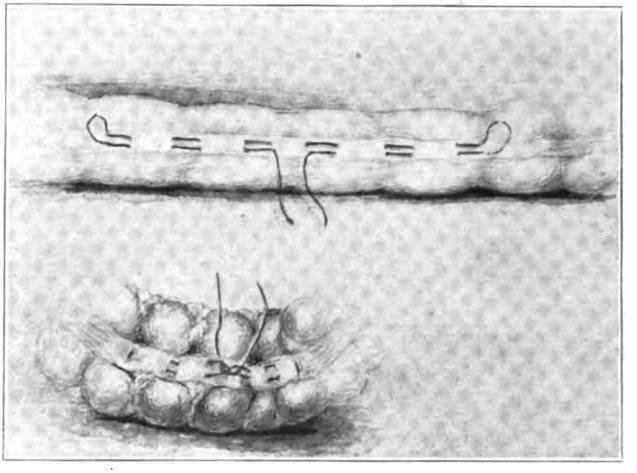

Fig. 9.—Shortening a stretched muscle band of the transverse colon by means of puckering stitch.

Fig. 10.—Sharp angulation, ptosis and filling defects at both flexures of colon, also marked ptosis of transverse colon.

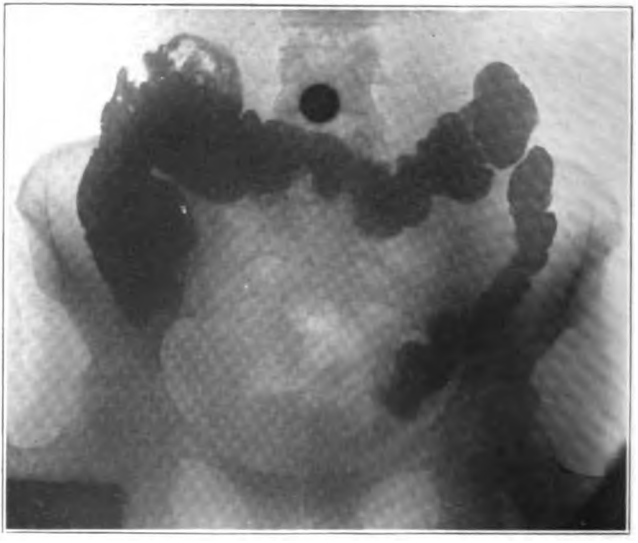

Fig. 11.—Appearance of colon one year after operation.

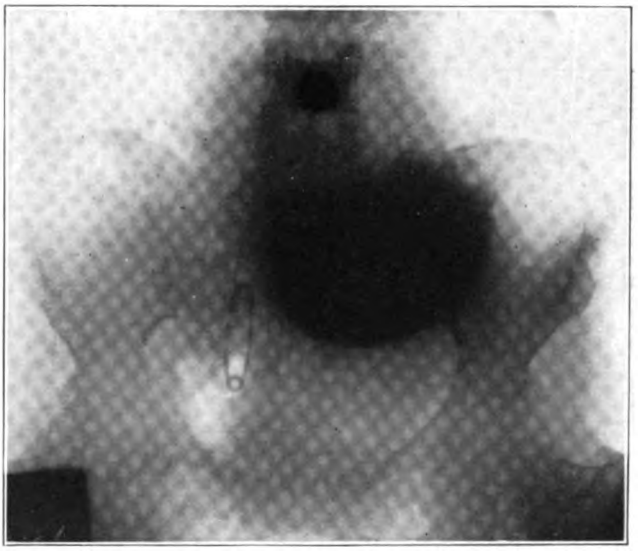

Fig. 12.—Low position of stomach before operation.

Fig. 13.—Position of stomach one year after operation.

Fig. 14.—Posture of patient (front view) before operation, three weeks after operation and seven months after operation.

Fig. 15.—Same patient as shown in Figure 14 viewed obliquely at the same periods.

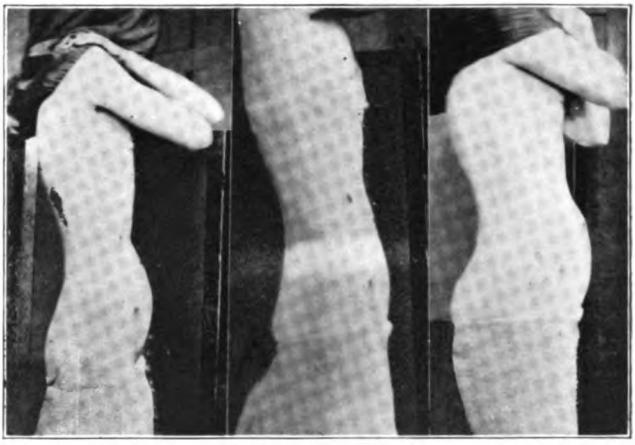

Fig. 16.—Same patient as shown in Figs. 14 and 15 in profile at the same periods.

INCAPACITY

The physical efficiency was estimated before operation and at present, through the questionnaires. Complete physical inability to work one week out of each month, with full ability to work the other three, is rated at 25 per cent. incapacity. Or, ability to do only half a day of housework each day, without periods of complete incapacity, is rated at 50 per cent. incapacity.

Before operation, the average degree of this incapacity per patient was 45.7 per cent. The questionnaire returns show an average incapacity per patient of 0.09 per cent. since operation. In other words, the physical efficiency of the entire group has been almost completely restored.

TABLE 2.—FINAL REPORTS IN SEVENTY-SEVEN CASES

	No. of Patients	Percentage
Cured	44	57
Much improved	25	32
Total satisfactory results	69	89
Slightly improved	5	7.5
Not improved	3	3.2
Total results not satisfactory	8	10.7

Many of these patients report having suffered from influenza or other illnesses which reduced our percentage of improvement, for the reports are based on the patients' estimate of their present condition.

TABLE 3.—RESULTS IN THE CASE OF SEVENTY-SEVEN PATIENTS ARRANGED IN GROUPS ACCORDING TO TIME SINCE OPERATION

Group	Years Since Operation	No. Cases	Per Cent. Cured	Per Cent. Much Improved	Per Cent. Slightly Improved	Per Cent. Not Improved
1.	From 1 to 2	25	28	44	16	12
2.	From 2 to 3½	25	60	40	..	..
3.	From 3½ to 8½	27	81.5	15	3.5	..

That these patients improved with time, and that their cure is permanent, is demonstrated by Table 3, which divides these cases into three groups, of equal number, according to the time since operation, and compares the results in the different groups.

Group 1 contains patients operated on from one to two years ago. Practically all of the unsatisfactory results are found in this group. The group also shows the smallest number of cured (28 per cent.) and the largest number of much improved, of the three groups.

In Group 2, from two to three and a half years have elapsed since operation, and not a single unsatisfactory report is recorded. The number of cured (60 per cent.) exceeds the number of much improved. The total satisfactory results in this group is 100 per cent.

Group 3, operated on from three and a half to eight and a half years ago, show the greatest number of cured of the three groups (81.5 per cent.), with a total of satisfactory results of 96.5 per cent.

The questionnaire returns further show that 78 per cent. of the patients consider themselves as still improving; 13 per cent. consider themselves as stationary in their improvement, and none of them consider themselves to have been made worse through having undergone the operation.

ABSTRACT OF DISCUSSION

DR. ROBERT T. MORRIS, New York: In order to discuss intelligently the subject of visceroptosis we must divide it into its various categories and consider the features of each. We are dealing with a group of defective patients, those who present stigmata, objective signs of arrested development of structure. It is almost impossible to place these patients back in good position as a unit in the social system, no matter what we do for them surgically or medically. Such patients have eyestrain, nonerupted molars, nasal hypertrophies and other sources for peripheral irritation. Another group represents changes in the anatomy because of the circumstances brought to bear. Structures develop resembling the kinks which Lane described, for example. Disturbances of the sympathetic ganglia of the autonomic and sympathetic systems which conduct digestion constitute a fourth category, perhaps, cases of psychoneuroses, mental depression and insanity; in fact, various end results of conditions which are anatomically and functionally wrong. If the work which has been done by Dr. Hazen relieves a certain percentage of these patients let us do that work. For instance, I often fix the loose kidney. These patients have the sagging colon because

of loose kidney. It can be fixed in ten or fifteen minutes so that it will stay in place permanently but it must be done in the right way. If you do not do these various operations as well as Dr. Hazen has done them, you are simply adding to the patient's troubles.

Dr. J. J. Gilbride, Philadelphia: It would not be possible in Philadelphia to operate on so large a number of patients as reported by Dr. Hazen because we know how to treat them better. Occasionally, some of our professors are misled into operating in some of these cases with disastrous results. I recall a patient complaining of severe pain in the right lower abdomen. She weighed about 95 pounds. One professor had taken out her appendix, another professor fixed the kidney and another professor did a curettage, while still another operated on her nose. Later, she consulted another professor and, of course, he dodged and recommended electrotherapeutics. Of course, she was an invalid. I did not want to operate as I did not believe I could do any good; however, I had a suspicion of an inclusion of the iliac hypogastric nerve within the scar of the kidney operation as causing the pain in the lower abdomen. The patient was a young woman and she and her aunt both persuaded me to operate on her. At operation I found the cause of the pain to be as I had anticipated, the inclusion of the nerve. She had complete relief. I put her on the treatment she should have had in the first place and a diet adapted to her gastrointestinal functions. She improved rapidly and in six months she had gained in weight so that she weighed 130 pounds.

Dr. J. Shelton Horsley, Richmond: The results obtained by Dr. Hazen have been excellent. It seems to me the reason all these patients are not cured is that toxic substances are absorbed and in the course of years this has a degenerating effect on nerve tissue, possibly on the sympathetic ganglia. Even after you effect a cure in the bowel function the changes in the sympathetic ganglia may be so great that the patient still has some of the neurasthenic symptoms; just as late operation for lesions of the brain does not cure epilepsy. I take it for granted that every case of stasis should be treated by a good medical man for at least six months before any operation is done. Should the patient not be cured, operation may be necessary. Coffey has demonstrated that the peritoneum is the strongest support within the abdomen. I have been doing a simple operation in cases of gastroptosis, a modification of Beyea's method. I start the suture on the left side, near the stomach wall, carry it up on the left side and return, on the right side in a reverse direction and tie. This makes a purse string suture in strong tissue and avoids the thin peritoneum in the center of the gastrohepatic omentum.

DR. CHARLES P. NOBLE, Philadelphia: There is no question that practically all these patients with ptosis are instances of arrested development from environmental causes. They are a separate group in the human family, and unless we look at them from that standpoint we fail to meet the situation. In a certain percentage of them mechanical surgery may afford relief from certain symptoms, but it does not alter the constitutional nature, and in order to secure good results in general they must be treated along physiologic lines. The general method is medicinal treatment followed by physical culture and outdoor life, and particularly the restriction of their activities within a much smaller amount of effort than is entirely physiologic for a normal individual. Unless that is done these people are always feeling sick. If the trouble is not in the intestines it is in the nervous system, and the varying symptoms simply show that they are expending more energy than they should. In other words, they are drawing on their potential nerve supply for ordinary use.

DR. RONALD HAZEN, Paris, Ill.: I realize that visceroptosis is a complicated condition to handle. With the male in the upright position there has been delay in the fastening of the ascending and descending colon to the back. It is a change due to our change of state. The female has not followed that quite as perfectly; first, because of the primary law that the female does not follow change of structure; and, second, that her pelvis is larger than that of the male and her symptoms do not usually appear until a certain time. All this time the colon has been loose. The condition is similar to that of a man with a broken arch; he may not have symptoms until he is on his feet. He may have been doing desk work and is without symptoms until he is required to be on his feet. The general psychic and peripheral symptoms referred to are important and I have thought of the relation of the sympathetic ganglia with a bowel that is down and pulling on the sympathetic nerves. The wonder is that we do not have more reflex symptoms. In treatment I did not intend to advocate operation for every patient whose colon is down. Almost all these patients are patients referred by physicians who have done their best. We do not advocate operation. In fact, I should not want to advocate operation for general use. It should be done only by men particularly interested in this field of work because the general conception of the whole abnormality of the anatomy is so complicated that we cannot make the repair with any one method of operation. As Dr. Gilbride told us there is too great a tendency to operate without study. Thirteen per cent. of the patients in our series had had operation before we saw them, without relief. To repair a gastroptosis many factors have to be correlated to produce a satisfactory result.

LIST OF FELLOWS OF THE AMERICAN MEDICAL ASSOCIATION REGISTERED IN THE SECTION ON OBSTETRICS, GYNECOLOGY AND ABDOMINAL SURGERY

List of Fellows of the American Medical Association who registered in this Section at one or more of the last five Annual Sessions, together with Fellows who have subscribed for the Transactions of the Section for 1919. The figures following the names indicate the attendance at the Annual Sessions (9 indicates 1919, 8 indicates 1918, etc.). T follows names of nonattendant Fellows subscribing for the Transactions for 1919.

Corrections will be appreciated.

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Flynn, Theobald M. M., 801 German St., Erie, Pa. 6.
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Fooder, Horace M., Williamstown, N. J., 9.
Forbes, Edwin B., David Whitney Bldg., Detroit. 6.
Ford, Alice P., New Haven, Conn., 9.
Ford, William M., 1925 7th Ave., New York City, 7.
Fort, R. E., 209 N. Vine St., Nashville, Tenn. 6.
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Gaines, J. A., Jackson Bldg., Nashville, Tenn. 6.
Garcelon, Harold W., Lewiston, Maine, 9.
Gardiner, John P., Colton Bldg., Toledo, Ohio. 6, 9.
Gardner, Wm. S., 6 W. Preston St., Baltimore. 4, 6, 9, 0, 2, 4, 8.
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Goffe, J. Riddle, Stockbridge, Mass., 4, 5, 6, 7, 0, 2, 3, 4, 8, 9.
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Gould, Lyman K., Ft. Wayne, Ind., 9.
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Graham, Henry J., Mishawaka, Ind., 8.
Graham, Ralph, Monmouth, Ill., T.
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Graves, Lattie, Scottsville, Ky., 9.
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Gray, Wm. B., Plainfield, N. J., 9. Francisco, Calif. 5.
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Gunn, John W., Hennessy Blk., Butte, Mont. 5.

Guthrie, Donald, Sayre, Pa., 9.
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Hall, Rufus B.. Berkshire Bldg., Cincinnati, 9.
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Hardt, A. F., Williamsport, Pa., T.
Hare, Chas. B., Letterman General Hosp., San Francisco, 5.
Hare, Jessie D., Griffith McKenzie Bldg., Fresno, Calif. 6.
Hargrave, Edward T., Taylor Bldg., Norfolk, Va. 7, 9.
Harpel, Kate S., Boone Nat'l Bldg., Boone, Iowa, 8.
Harrar, James A., 108 E. 64th St., New York City, 7.
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Haynes, L. W., 1013 David Whitney Bldg., Detroit. 6.
Hazen, Roland, Paris, Ill., 9.
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Henderson, W. T., Mobile, Ala., T.
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Herkner, Henry A., 930 E. 79th St., Cleveland. 6.
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Hertzler, Arthur E., Halstead, Kan. 1, 4, 8.
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Hewitt, William F., 7027 Euclid Ave., Chicago, 8.
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Hockman, B. F., Sumner, Ill., 8.
Hoffman, C. S., Keyser, W. Va., T.
Hoffman, Lawrence H., 177 Post St., San Francisco. 5.
Hogan, J. J., 126½ Main St., Ashtabula, Ohio. 6.
Hogan, J. M., Oshkosh, Wis., T.
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Holmes, Rudolph W., 414 Arlington Place, Chicago. 4, 8, 3, 6, 8.
Holmes, Will H., 303 Lowry Blk., Riverside, Calif. 5.
Holsti, Osten, Aberdeen, Wash. 5.
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Hood, C. S., Ferndale, Wash. 5.
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Howe, H. N., 7 Bank Row, Greenfield, Mass., 7.
Hoyt, D. C., 166 Eugenie St., Chicago, 8.
Hughes, Eliz. M., 1924 N. 63d St., Philadelphia, 9.

Huizenga, R., Rock Valley, Iowa, 8.
Humiston, Wm. H., Rose Bldg., Cleveland. 4, 6.
Hungerford, Perry R., Concord, Mich. 6.
Hunner, Guy L., 2305 St. Paul St., Baltimore, 9.
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Hyde, Harriet Baker, Maple and Putnam Aves., Greenwich, Conn. 6, 9.
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Ireland, R. Lindsey, The Atherton Bldg., Louisville, Ky. T.
Irwin, John C., 237 Halket St., Oakland, Pittsburgh. 6, 9.
Jack, Harvey P., 26 Main St., Hornell, N. Y., 7.
Jackson, Frank H., Houlton, Maine, T.
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Jarcho, Julius, 53 W. 110th St., New York City, 7.
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Jennings, Walter B., 17 E. 38th St., New York. 7.
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Jewett, Wm. E., Jr., Adrian, Mich., 9.
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Johnson, Oscar V., Sebeka, Minn., 8.
Johnson, Ray H., 449 Franklin St., Buffalo. 7, 2, 6.
Johnson, R. K., 230 Chicago Blvd., Detroit. 6, 8, 9.
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Jolley, Louis B., 18th St., North Chicago, Ill. 3, 8.
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Jones, R. M., 511 Rowell Bldg., Fresno, Calif. 5.
Jordan, William F., Huntsville, Ala. 5.
Joslyn, Leslie B., 43 S. 19th Ave., Maywood, Ill., 8.
Joyner, W. T., Roswell, N. M., 7.
Judd, C. Hollister, 1229 David Whitney Bldg., Detroit. 6.
Judge, Thomas A., 1st Nat'l Bk. Bldg., Milwaukee, Wis. 8.
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Kahn, Sol G., Boston Bldg., Salt Lake City. 2, 5.
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Karr, Herbert S., McKerchey Bldg., Detroit. 6.
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Kellogg, E. Wells, 420 Mitchell St., Milwaukee. 6.
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Kelly, Ellis W., Temperance, Mich. 6.
Kelly, Howard A., 1418 Eutaw Pl., Baltimore. T.
Kelly, Walter F., 5503 E. Washington St., Indianapolis. 6, 8.
Kelso, George B., 807 N. Main St., Bloomington, Ill., 8.
Kennedy, Bernays, Willoughby Bldg., Indianapolis. 0, 3, 4, 6.
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Kergan, Henry S., Oakland, Calif., 9.
Kessler, Henry B., to Norfolk St., Newark, N. J., 7.
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de Kieffer, Otto M., 6142 Eberhart Ave., Chicago, 8.
Kight, Rugus S., Taylor Bldg., Norfolk, Va., 9.
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King, E. L., Medical Bldg., New Orleans. 6.
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Klump, Geo. B., Williamsport, Pa. 4. 9.
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Knickerbocker, F. H., Staples, Minn. 6.
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Lorentz, Robert, Monadnock Bldg., San Francisco. 5.
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Loughridge, Sherman, Grants Pass, Ore. 5.
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Marion, Norman E., Big Rock, Ill., 8.
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McBride, Geo. E., Magna, Utah, 9.
McChord, R. C., Lebanon, Ky., T.
McClanahan, John M., Guilford, Mo. 6.
McClellan, Ben R., Xenia, O., T.
McClellan, Clarence, Stronghurst, Ill. 8.
McClellan, G. W., Canandaigua, N. Y., 9.
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McDowell, Hugh, 3199 Main St., Buffalo. 6.
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McLaren, J. L., California Bldg., Los Angeles. 4, 5.
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McMillan, Roscoe D., Red Springs, N. C., 7.
McMurdie, A. E., 459 Ferry Park Ave., Detroit. 6.
McMurtry, L. S., 5 Ormsby Pl., Louisville, Ky. 4, 5, 6, 7, 8, 0, 2, 3, 4, 6.
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McNeil, H. G., Exchange Bldg., Los Angeles. 5.
McNeile, Lyle G., Marsh-Strong Bldg., Los Angeles. 1, 5, 6.
McNeile, Olga, Marsh-Strong Bldg., Los Angeles. 5, 6.
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McNutt, W. F., Butler Bldg., San Francisco. 5.
McReynolds, R. P., B. F. Coulter Bldg., Los Angeles. 4, 5.
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Mesker, George H., Olivia, Minn., 8.
Metcalf, Wm. F., D. Whitney Bldg., Detroit, Mich. 6.
Meyers, Elmer L., Wilkes Barre, Pa., 9.
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Miles, Clarence C., Greenport, N. Y., 7.
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Miller, A. Merrill, Danville, Ill., 8.
Miller, Clyde K., 461 Fort Washington Ave., New York City, 7.
Miller, C. Jeff, 1638 Joseph St., New Orleans. 6, 7, 8, 9, 0, 1, 2, 4, 8, 9.
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Miller, Fred E., 832 Milwaukee Ave., Chicago, 8.
Miller, Frederick M., Gardner Blk., Utica, N. Y., 7.
Miller, James R., Hartford National Bank Bldg., Hartford, Conn. 6.
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Moore, W. G., 177 Post St., San Francisco. 5.
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Morgan, E. E., Fort Wayne, Ind., 7.
Morley, W. H., Pontiac, Mich. 6.
alemon St., Brooklyn. 6, 9.
Morris, Charles A., Brower Bldg., Bakersfield, Calif. 5.
Morse, Arthur H., New Haven, Conn. 5.
Morton, G. V., Fort Worth Nat. Bldg., Fort Worth, Texas, 8.
Mosher, E. M., Glen Hall, 184 Joralemon St., Brooklyn, 6, 9.
Mosler, Fred H., 48 W. 89th St., New York City, 7.
Mount, Walter B., 21 Plymouth St., Montclair, N. J. 4, 9.
Mudd, H. G., Humboldt Bldg., St. Louis, T.
Mueller, E. F., Dyersville, Iowa, 8.
Mueller, George, 2024 Pierce Ave., Chicago. T.
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Muller, William K., 6004 Greene St., Philadelphia, Pa., 7.
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Munger, I. C., 1st Nat'l Bk. Bldg., Lincoln, Neb. 5, 8.
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Munter, Leo, Hewes Bldg., San Francisco. 1, 5.
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Mysel, Hymen A., Haverhill, Mass., 9.
Naegeli, Frank, Manhattan Bldg., Fergus Falls, Minn. 3, 7.
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Neiffer, Milton K., Wyncote, Pa., 9.
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Newton, G. A., Freeport, N. Y., 7.
Newton, John C., 291 Geary St., San Francisco. 1, 5.
Nickerson, Anson LeRoy, Cobb Bldg., Kankakee, Ill. 6.
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Noble, Nelle S., Equitable Bldg., Des Moines, Iowa, 8.
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Norris, Leonard E., 578 Broad St., Providence, R. I., 7.
Norris, R. C., 500 N. 20th St., Philadelphia. T.
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Noyes, Geo. B., Stone Lake, Wis., 8.
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O'Connor, T. H., Clements 453, San Francisco. T.
O'Donnell, Alfred, Ellsworth, Kan., 8.
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Old, Levi, Taylor Bldg., Norfolk, Va., T.
Osborn, Samuel, City National Bk. Bldg., Lansing, Mich. T.
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Parry, Roger S., Main and Bean Sts., Washington, Pa. 7, 8.
Parsons, Frank S., 367 Adams St., Boston, 9.
Parsons, H. J., Highland Sanit., Shreveport, La., 9.
Pascoe, M. W., Taft, Calif. 5, 8.
Patterson, R. M., Beaver Falls, Pa., 9.
Patton, A. G., Patton Block, Monmouth, Ill., 8.
Paulson, Mary W., Hinsdale, Ill., 7.
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Peek, Allen, Oxnard, Calif. 5.
Pennington, J. R., 31 N. State St., Chicago. 3, 4, 5.
Perisho, E. E., 221 Main St., Streator, Ill., 8.
Perreault, Jos. N., Danielson, Conn., 9.
Perry, Gentz, Amery, Wis. 6.
Perry, Samuel W., 229 E. North Ave., New Castle, Pa. 1, 6.
Peterson, George E., 343 Broadway, Waukesha, Wis., 8.
Peterson, Jacob S., 112 E. 85th St., New York, 9.
Peterson, Reuben, Ann Arbor, Mich. 6, 8, 9.
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Pfaff, O. G., Newton Claypool Bldg., Indianapolis. 6, 7, 2, 4, 6.
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Pfeiffenberger, Mather, 463 Bluff St., Alton, Ill. 5, 6, 8.
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Plice, William A., 3828 Gladys Ave., Chicago. 8.
Polak, John O., 287 Clinton Ave., Brooklyn. 4, 6, 7, 9, 1, 2, 3, 4, 5, 6, 9.
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Porter, L. V., Bondurant, Iowa, 8.
Porter, M. F., Fort Wayne, Ind., T.
Porter, Wm. E., 41 W. 73d St., New York, 9.
Porter, William S., Hotel Oakland, Oakland, Calif. 5.
Potter, Ellen C., 5138 Wayne Ave., Philadelphia, Pa. 8, 9.
Potter, Marion Craig, 1487 South Ave., Rochester, N. Y. 9, 2, 6, 9.
Potter, Mary E., 305 Washington Ave., Brooklyn. 5, 6, 9.
Pratt, Chas. A., 60 Orchard St., New Bedford, Mass. T.
Prescott, Eva., 608 S. Gunderson, Oak Park, Ill., 8.
Preston, F. L., El Dorado, Kan., 9.
Price, Joseph, 1452 S. High St., Columbus, Ohio, 8.
Prime, William R., 3750 Broadway, New York City, 7.
Pringle, Jesse A., Bagley, Iowa. 6.
Pritzker, Louis J., 1332- 25 East Washington St., Chicago. 8.
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Pyle, J. L., Chester, W. Va. 4, 8, 9.
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Quantius, Leland F., McPherson, Kan., 8.
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Ragland, Wilhelmina A., 115 E. 17th St., New York City, 7.
Ramsay, B. L., 5660 W. Lake St., Chicago, 8.
Rand, Richard F., 246 Church St., New Haven, Conn., 7.
Rang, Arthur A., Washington, Ind., T.
Rarick, J. E., Wolcottville, Ind., T.
Rathbun, Frank D., New Windsor, Ill., 8 .
Ratliff, H. M., 265 W. 81st St., New York City. 7.
Ratterman, Helena T., 1532 Elm St., Cincinati. 6, 8, 9.
Rawls, Reginald M., 350 W. 88th St., New York City, 7.
Reberdy, George J., David Whitney Bldg., Detroit. 6.
Reed, Charles A. L., 5 W. 8th St., Cincinnati. 6, 9, 2, 4, 6, 8, 9.
Reed, Wm. W., Blue Rapids, Kan., 9.
Reese, Frank D., 16 Tompkins St., Cortland, N. Y. 4, 9.
Reeves, W. P., 100 E. Capitol St., Washington, D. C., T.
Reich, Adolph, 245 W. 24th St., New York City, 7.
Reilly, John P., 215 Elizabeth Ave., Elizabeth, N. J. 2, 4, 9.
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Renaud, J. T. U., 5052 Cottage Grove Ave., Chicago, 8.
Repp, W. A., David Whitney Bldg., Detroit. 6.
Reynolds, E., 321 Dartmouth St., Boston. 6, 7, 3, 5, 6.
Reynolds, Robert G., Wilson Bldg., Palo Alto, Calif. 5.
Richards, R. Milton, David Whitney Bldg., Detroit. 6.
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Ripley, Clarence B., Galesburg, Ill., 8.
Roberts, Carl G., 152 W. Division St., Chicago, 8.
Robertson, Victor A., 51 Eighth Ave., Brooklyn, N. Y., 7.
Robinson, Annie M., 1st Nat. Bk. Bldg., Birmingham, Ala., 9.
Robinson, M. R., 1261 Madison Ave., New York City, 7.
Robison, Geo. E., Provo Gen. Hosp., Provo, Utah. 5, 8.
Rodger, D. R., Richmond Hill, N. Y., 9.
Rogers, Joseph D., 1400 M St., Washington, D. C. 2, 4, 9.
Rohr, Fred W., 4159 N. Robey St., Chicago. 8.
Rolins, C. D., 233 W. Forsythe St., Jacksonville, Fla. 7.
Rongy, A. J., 345 W. 88th St., New York City. 2, 4, 6.
Rose, Frances E., O. N. B. Bldg., Spokane, Wash., 9.
Rosengren, Chas. J., 218 E. Ferry St., Buffalo. 2, 3, 4, 5, 6.
Rosenthal, Max, 26 W. 90th St., New York City, 7.
Ross, David, Board of Trade Bldg., Indianapolis. T.
Ross, H. E., Daniel Bldg., Danville, Ill. 6.
Rossman, C. G., Hudson, N. Y.. T.
Roth, Charles R., 30 N. Michigan Ave., Chicago, 8.
Roth, Henry, 409 E. 140 St., New York, T.
Rowland, J. M. H., 1204 Madison Ave., Baltimore, Md., 8.
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Rubovits, William H., 5241 Drexel Ave., Chicago. 8.
Rucker, M. P., 1207 Decatur St., Manchester, Richmond, Va. 6.
Russ, W. B., Hicks Bldg., San Antonio, Texas. T.
Sadler, Lena K., 2748 Pine Grove Ave., Chicago. 8, 1, 6, 8.
Sadler, William S., 32 N. State St., Chicago. 6.
Sagerson, Robert J., 643 Locust St., Johnstown, Pa., 7.
Salatich, Peter B., 3202 St. Charles Ave., New Orleans, La. 7, 8, 9.
Saleeby, N. M., 88 Broad St., New York, T.
Samuel, Ernest C., 1522 Aline, New Orleans, La. 7, 9.
Sand, Olaf, Box 26, Fargo, N. D., 8.
Sandberg, Carl L., Judge Bldg., Salt Lake City, Utah. 8.
Sanderson, S. Edward, 159 Warren Ave., E., Detroit. 6.
Sanes, K. I., Jenkins Bldg., Pittsburg. 4, 6, 7, 9, 0, 2, 3, 4, 6, 8, 9.
Sandow B. F., 297 Lee St., Oakland Calif. 5.
Santee, D. K., Bethlehem, Pa., 9.
Saunders, Orris W., 1700 Broadway, Camden, N. J. 4, 9.
Sawyer, M. H., Central Life Bldg., Ottawa, Ill. 3, 8.
Scanlan, Thos. J., 161 Harvard St., Boston, 9.
Scheehle, J. E., 1504 Christian St., Philadelphia, T.
Schell, J. T., 1832 Diamond St., Philadelphia, Pa., 7.
Schemer, Ernest, Fowler, Mich. 6.
Schildecker, C. B., Park Bldg., Pittsburgh. 6.
Schiller, H., 5042 Drexel Blvd., Chicago, 8.
Schlink, Albert G., 10208 Euclid Ave., Cleveland, Ohio. 7, 9.
Schmitz, Henry, 25 E. Washington St., Chicago. 4, 5, 6, 8.
Schneider, G. A., 755 W. North Ave., Chicago, 8.
Schoen, Adolph, 218 E. 79th St., New York City, 7.
Schoenberg, Herman B., 490 West End Ave., New York, 9.
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Schram, Abraham W., 5131 Greenwood Ave., Chicago, 8.
Schrayer, W. S., 927 Noble St., Chicago, 8.
Schwab, Alwin H., 313 McDonough St., Brooklyn, N. Y., 7.
Schwab, Leslie W., 4315 Grand Blvd., Chicago, 8.
Scott, A. C., Temple, Texas, T.
Scott, Charles R., 222 7th Ave. N., Twin Falls, Idaho, 7, 8.
Scull, Wm. B., 3024 Richmond St., Philadelphia. T.
Sebille, Louis J., 1546 W. Fort St., Detroit. 6.
Seeligmann, Gustav, 53 East 72d St., New York City, 7.
Seibert, Minnie Simmons, Wenatchee, Wash. 5.
Seippel, Clara P., 25 E. Washington St., Chicago. 3, 8.
Seixas, Marie A., 143 W. 71st St., New York City, 7.
Sellers, Ira J., Empire Bldg., Birmingham, Ala. T.
Seymour, N. G., 129 E. 17th St., New York City, 7.
Shailer, Sumner, 39 Clearemont Ave., New York City, 7.
Shallenberger, Wm. F., Hurt Bldg., Atlanta, 9.
Sharp, J. R., Oil City, Pa., 7.
Shea, William E., Hammond Blk., Missoula, Mont. 5.
Sheehey, John J., 349 Union St., Brooklyn, N. Y., 7.
Shelly, Edwin T., Sixth and Commerce St., Atchinson, Kan., 8.
Shillito, Frederick, Kalamazoo Natl. Bk. Bldg., Kalamazoo, Mich. 6.
Shimer, Sterling D., 120 N. 3d St., Easton, Pa. 9, 2, 4, 9.
Shlenker, Milton A., Hotel Marie Antoinette, New York City, 7.
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Silver, Maxwell E., 41 Warren Ave., E., Detroit. 6.
Simon, Ludwig S., 4743 Forrestville Ave., Chicago, 8.
Simpson, B. J., 6340 Halsted St., Chicago. 6.
Simpson, C. E., Kresge Bldg., Detroit, 6.
Simpson, F. F., Jenkins Arcade Bldg., Pittsburgh. 4, 6, 7, 9, 0, 1, 2, 3, 4, 6, 8.
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Sivon, S. U., Ravenna, Ohio, 9.
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Slemons, J. Morris, 284 Orange St., New Haven, Conn. 5.
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Smith, Christine Lucas, 1519 Mt. Elliott Ave., Detroit. 6.
Smith, Clarence A., Cobb Bldg., Seattle. 5.
Smith, David T., Omir, Mich., 9.
Smith, George Mortimer, 228 Stanley St., Chippewa Falls, Wis., 8.
Smith, George Ritter, Burley, Idaho, 8.
Smith, J. Gregg, Williston, S. C., 9.
Smith, Mary A., 33 Newberry St., Boston. 3, 5.
Smith, Norman M., 3010 Hennepin Ave., Minneapolis, 9.
Smith, Robert A., 819 Sheridan Rd., Chicago. 8.
Smith, T. Hardy, 157 W. 2d St., Pomona, Calif. 5.
Smith, W. J., Wardell Blk., Cadillac, Mich. 5.
Smith, W. F., 337 N. Jefferson St., Huntington, Ind. 6.
Sneden, Claude M., Littleton, N. H., 9.
Snyder, P. F., 1036 N. Oakley Ave., Chicago. 8.
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Southworth, H. E., Wright & Callender Bldg., Los Angeles. 5.
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Spickers, Wm. Paterson, N. J., T.
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Spurney, A. B., Osborn Bldg., Cleveland. 2, 3, 4, 6, 9.
Staats, O. M., Wheeling, W. Va., 9.
Stadter, John M., Wilmington, Del., 9.
Stafford, C. M., J. H. Smith Bldg., Detroit. 6.
Stanley, O. O., Urbana, Ill., 8.
Stansell, Ivy, Sanderson, Tex., 9.
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Sullivan, Robert Y., The Rochambeau, Washington, D. C., 9.
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Taylor, F. C., Peru, Ill. 8.
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Taylor, R. S., 1425½ Harrison St., Detroit, 9.
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Taylor, Willis H., McCague Bldg., Omaha, Neb. 8.
Teass, Chester J., Medical Bldg., San Fransico. 5.
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Terry, Ira B., Jr., 131 E. 74th St., New York City, 7.
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Thomas, G. N., 2504 Montana St., El Paso, Texas. 5, 8.
Thomas, J. J., 1110 Euclid Ave., Cleveland. 5.
Thomas, Luther A., Painted Post, N. Y., 9.
Thomas, Vernon D., Hiland Bldg., Pittsburgh, 9.
Thome, W. M., Mt. Joy, Pa., 9.
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Thompson, Chas. O., 589 Beacon St., Boston. 6.
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Throckmorton, Jeannette F., Charlton, Iowa. 3, 4, 8.
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Titus, Paul, Alder Court, Pittsburgh, Pa. 8.
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Tobin, J. R., 540 South St., Elgin, Ill. 8.
Tobin, Thomas J., 138 W. 71st St., New York City, 7.
Told, Elizabeth, 25 E. Washington St., Chicago. 8.
Topham, Edward, Flood Bldg., San Francisco. 5.
Towne, G. Scott, 150 Philadelphia St., Saratoga Springs, N. Y., 7, 8.
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Traubitz, Arnold, Vanduser, Mo. 8.
Trevaskis, A. L., Turtle Creek, Pa., 9.
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Turner, Alexander Loudin, 1042 W. Warren Ave., Detroit. 6.
Turner, Chas. E., 883 Mt. Vernon Ave., Columbus, Ohio. 6.
Turner, Linton, 450 Lyceum St, Philadelphia, 9.
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Underwood, J. Harris, Woodbury, N. J., 9.
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Urbanski, Nicholas A. J., 472 Amherst St., Buffalo. 6.
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Van Orsdale, F. H., N. Main St., Belmont, N. Y., 7, 9.
Van Tine, Cochran, Selby, Calif. 5.
Vaughan, W. R., Plainwell, Mich., 6.
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Voorhees, Harry M. Brockman Bldg., Los Angeles. 5.
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Waldrep, N. C., Tishomingo, Miss. 8.
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Watson, W. C., 446 Stratford Ave., Bridgeport, Conn. 4, 9.
Watts, James C., 314 First Ave., Rome, Ga. 8.

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Weithause, Helen E., Vineland, N. J., 9.
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Welpton, Martha, Amer. Nat'l Bank Bldg., San Diego, Calif. 7, 8, 9.
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